AVIATION WEEK
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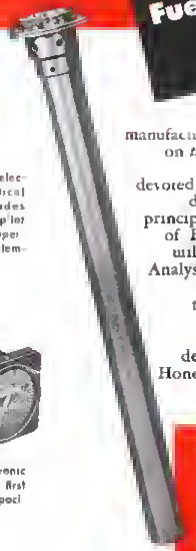

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Aviation Week

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NEWS DIGEST

DOMESTIC

Westinghouse Electric Corp. has been awarded an Air Force contract for axial flow compressors and attendant drive motors, control equipment and switchgear to power the 16 x 16 ft. supersonic propulsion wind tunnel at the Arnold Engineering Development Center at Tullahoma, Tenn. Total of 216,000 hp. is supplied by electric motors to five compressors. Tunnel is to be capable of speeds up to Mach 3.5.

Passing of the T-6 "Texan" as USAF's basic trainer is becoming evident as increasing numbers of the newer, heavier North American T-28s make their debut at USAF training bases. Latest to convert to the T-28 is Vance AFB, Okla. The T-6, which has seen over a decade of pilot training duty, is still not scheduled for the scrap pile. The trainers are being sent to technical schools where they will be used in training engine and airplane mechanics.

Stratos Corp., subsidiary of the Fairchild Engine & Airplane Corp., has been renamed Stratos division. The wholly owned Fairchild subsidiary manufactures aircraft superchargers, cooling units and associated equipment. Stratos is managed by F. E. Newbold, Jr.

A North American B-45B piloted by a crew of three—pilot, co-pilot and navigator—flew nonstop from March AFB, Calif., to Langley AFB, Va., in 4 hr. and 6 min. Ground speed of the GE J-47-powered light bomber was 569 mph. One hour out of March AFB, the cabin heating system went out, very nearly halting the flight. Lowest cabin temperature during flight was —50 deg.

USAF's Airways and Air Communications Service still can't meet a critical shortage of civilian electronics and communications engineers for Pacific area assignments. Pay grades range from 7 to 12. Air Force asks applicants to write Commanding General, Headquarters AACS, Washington 25, D. C., Attn: Director of Personnel.

Navy has let construction contracts totaling $35 million to complete production lines for assembly and loading of aircraft rockets at the Naval Ordnance Depot, Sunnaker, Ark. Begun originally during World War II, work was stopped shortly after VJ-Day with the facility about 60 percent complete. Original expenditure for construction was $135 million. The facility when completed, next year, will fill needs of Marine, USAF, and Naval aviation.

Wright Aeronautical Corp. employes conducted a wildcat strike as negotiations on wage and other issues broke down. The lineup, which early last week shut the plant, was preceded by a two-day walkout stemming from union rejection of a five-cents-an-hour raise. The workers returned, but left 24 hours later despite WAC's offer of 14 cents more.

Flying Tiger Line, with a high bid of $590,000, has purchased 18 Curtiss C-46 Commandos from USAF. Three other bids were received by the Air Materiel Command, from American Airlines, Slick Airways and Alaska Airlines.

Brig. Gen. Robert A. Nagle, Commanding General of the 433rd Troop Carrier Wing, died at Newton, Mass. He was 53 years old. A flyer since World War I, he was with the Training Command, Air Service Command and Fourth Air Force during World War II. Following the war he was Cleveland district sales manager of Talon, Inc., and was to have returned to active duty the week of his death. He was first vice president of the Air Reserve Assn.

FINANCIAL

A $30-million bank credit has been obtained by Eastern Air Lines to finance its new $40 million equipment program consisting of 35 Martin 4-0-4s and 14 Lockheed 1049 Constellations. The five-year credit was arranged with a group of 27 banks located along EAL's system.

Convair reports $1,069,784 net profit for the quarter ended Aug. 31, and $5,536,311 for the first nine months this year. Sales for the nine months totaled $191,000,000.

INTERNATIONAL

New York-Rome nonstop flight was completed by Italian Airlines DC-6 in 15 hr., 10 min. Great circle distance is 4007 miles. Plane was flown by Capt. Bruno Trocca and crew of six.

British European Airways is to put into freight service on British routes two C-47s powered by Rolls-Royce Dart turboprop engines. The turboprop service is to start after the first of the year. Main purpose apparently is to gain operational experience with the Dart engine, a later version of which will power BEA's Viscount 701-passenger transports scheduled to go into service in 1952.

AVIATION CALENDAR

Oct. 16-20—1950 annual general meeting of the International Air Transport Assn., Fairmont Hotel, San Francisco.

Oct. 16-20—Fourth meeting of CAA airport Advisory Committee, Ft. Worth.

Oct. 17—ICAO Middle East regional air navigation meeting, second session, Istanbul, Turkey.

Oct. 17-18—Third annual airport management conference, sponsored by N. Y. State Commerce Dept., Hotel Onondaga, Syracuse, N. Y.

Oct. 18-20—Annual national conference of the Society of the Plastics Industry, Inc., in cooperation with Harvard Business School, Swampscott, Mass.

Oct. 22—Second annual aircraft efficiency race, sponsored by the aviation committee of the Colorado Springs Junior Chamber of Commerce, Colo. (Alternate rain date, Oct. 29.)

Oct. 22-28—31st annual meeting, American Welding Society, Hotel Sherman, Chicago, Ill.

Oct. 23-27—Fall general meeting of the American Institute of Electrical Engineers, Skirvin Hotel, Oklahoma City.

Oct. 24-25—Third biennial Materials Handling Conference, sponsored by Westinghouse Electric Corp., Hotel Statler, Buffalo, N. Y.

Oct. 24-26—Annual meeting of Society for Non Destructive Testing, in conjunction with National Metals Congress, Morrison Hotel, Chicago.

Oct. 26-27—Fifth annual Arizona aviation conference, sponsored by the aviation committee of the Tucson Chamber of Commerce, Tucson, Ariz.

Oct. 30-31, Nov. 1—Flight Safety Foundation annual Safety Seminar, Denver, Colo.

Nov. 1-3—Eleventh annual convention, National Aviation Trades Assn., Chase Hotel, St. Louis.

Nov. 14—ICAO rules of the air and air traffic control meeting, fourth session, Montreal, Canada.

Nov. 28-30—Airport fire safety clinic sponsored by the National Fire Protection Assn. committee on aviation and airport fire protection, Baker Hotel, Dallas.

Nov. 29-Dec. 1—Eighth annual meeting of Aviation Distributors and Manufacturers Assn., Ambassador Hotel, Los Angeles.

Nov. 30—Airport fire safety clinic, sponsored by Committee on Aviation and Airport Fire Protection of the National Fire Protection Assn., Baker Hotel, Dallas.

Dec. 16—14th Wright Brothers Lecture, Institute of Aeronautical Sciences, U. S. Chamber of Commerce Auditorium, Washington, D. C.

Jan. 8-10, 1951—Florida Air Pilots Assn. air show and exposition of planes and equipment, Opa Locka Airport, Fla.

Jan. 15-18—Plant maintenance show and concurrent conference on plant maintenance techniques, Cleveland, Ohio.

Jan. 29-Feb. 1—19th annual meeting of the Institute of Aeronautical Sciences, Hotel Astor, N. Y.

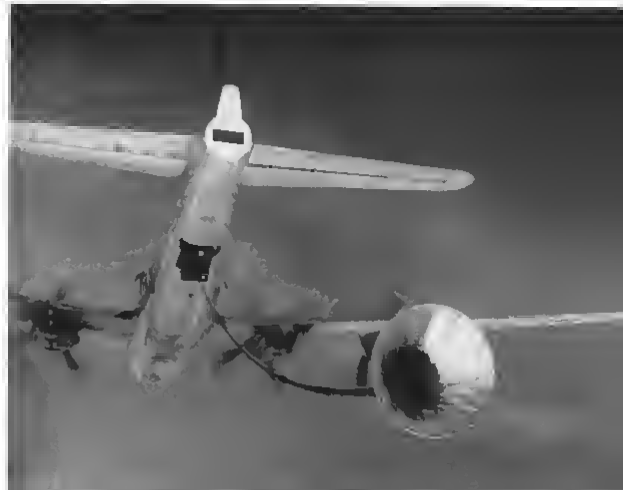
PICTURE CREDITS

9—(top) Levy-Shipp, (bottom) INP. 13—Curtiss-Wright. 15—Curtiss-Wright. 14—Acme. 16—Convair. 45—Ryan

PACKET REVISION—Fairchild engineers at Hagerstown have modified this C-119B by providing greater dorsal fin area to improve directional stability. Outer horizontal fins are removed. Changes have not yet been assigned to C-119s already in service.

PRO AND CON—Two aspects of aircraft icing research are shown in the above views. The USAF C-54 (left) is fitted with a special ring to produce rain, snow, mist or fog on demand for aerial study. The Sikorsky XH-5 (right) has a Janitrol S-200 heater mounted externally to feed heated air into the hollow rotor blades for anti-icing. The heater supplies 20,000 Btu./hr. to blades and cabin.

News Picture Highlights



SUPERTANKRESS—Fighter pilot's eye view of the refueling hose and drogue trailing from the belly of a Boeing B-29 tanker. As done by the Republic F-84E, the Thunderjet pilot aims a probe, mounted in the left wing, at the drogue. Upon contact, automatic valves start the flow of fuel at a rapid rate. It takes about six-seven minutes to top off the F-84's tanks. Flow of fuel stops automatically when tanks are full.

WHO'S WHERE

In the Front Office

H. M. Woodhams has been appointed managing director of Armstrong Whitworth Aircraft, Ltd., Coventry. Associated with the industry since 1909, Woodhams joined the company in 1923 as chief inspector. He was elected to the board in 1941.

D. W. Holmes has been made vice president-sales for Parker Appliance Co., maker of aircraft hydraulic valves and associated equipment. He has been general sales manager of the concern for the past four years and came to Parker from the Weatherhead Co.

Mel Anderson has joined Lake Central Airlines as vice president-traffic and sales. He came from Trans-Texas Airways where he was sales manager. He has 22 years of transportation experience in various fields.

J. B. Carrillo has been named special assistant to the vice president-operations, and vice president, director of Philippine Air Lines, where he will plan maintenance and research and other technical problems relating to international operations. He had been with Douglas Aircraft for 14 years.

Robert Q. "Pete" Parsons, formerly sales engineer for Firestone Tire & Rubber's aircraft division, has joined Century Engineers as executive vice president. The company is active as consultants in the aviation and automotive fields.

Changes

H. J. Williamson has been named controller of air services, Department of Transport, Ottawa, Canada. He has been with the department for 19 years.

► **Among the Manufacturers**—August Bringewald, AMC specialist in production methods, has joined Republic Aviation as tooling research and development engineer. . . . Richard E. White, previously with BuAer's powerplant division, has been named chief administrative engineer for Ryan Aeronautical's metal products division.

► **Among the Airlines**—Arthur L. Stewart is Trans World Airlines' head of newly created Pacific Ocean sales region. . . . Joseph Jordan has been appointed director of public relations for Italian Airlines (LAI). . . . Marvin L. Davis has been promoted to general traffic and sales manager of Pioneer Air Lines, and Lewis M. Zafran has been made his assistant.

F. E. Hembree is new superintendent of stations for the Flying Tiger Line. . . . Willis C. Baker has been appointed general traffic manager for National Airlines.

R. E. McDonald, formerly with Northwest Airlines, has been appointed chief engineer for Mid-Continent Airlines. **C. H. Calhoun**, MCA's longtime vice president-engineering and maintenance, who made the announcement, was incorrectly listed as the appointee in AVIATION WEEK, Oct. 2.

INDUSTRY OBSERVER

(This week's column reports the observations of an AVIATION WEEK *editor, David A. Anderton, who visited England for the Society of British Aircraft Constructors show at Farnborough.)*

► **Avro 707B was joined at Boscombe Down, RAF experimental field, by two other delta-wing research aircraft. One is built by Fairey, and could be the plane which has been flown by the Fairey-built Beta rocket motor (AVIATION WEEK Oct. 9). Other is by Boulton-Paul.**

► Third de Havilland Comet is expected to fly before year's end. When inspected at D. H.'s Hatfield works, the plane was structurally complete, and work was progressing rapidly on fitting and finishing. Major difference from earlier two Comets is first retractable bogie landing gear. Flight time on first Comet is now over 270 hr., on second, over 25.

► **Vickers-Armstrongs 535 was flown in excess of Mach .86 in high-speed flyby on third day of Farnborough show. Pilot for this and other 535 demonstrations was M. Lithgow.**

► Blackburn and General Universal Freighter has forward hold capacity about that of Fairchild's Packet series. But after hold has an impressive, cathedral-like vaulted ceiling with at least 14 ft. headroom. However, that headroom is mostly over the inclined floor section which drops down to become the loading ramp, and is therefore quite useless for cargo-carrying.

► **Fairey 17, anti-submarine aircraft, has extremely small ground clearance around the bomb-bay section. Observers at the Farnborough show wondered how the plane could ever be bombed up without cutting pits in the carrier deck. It has the further complexity of a double fold in the wing. But Fairey, as a company, is in a better position than its anti-submarine competitor, Blackburn and General. Latter firm is undergoing attempted reorganization and much internal strife, which might make Royal Navy think twice about placing its contract on a basis of aircraft performance alone.**

► Avro Shackleton interior noise level is very high, causing pilot and observer fatigue. Importance of low noise level on long-range anti-submarine missions is so great that Coastal Command has strongly suggested changes. These include thickened Perspex for the cockpit, over-wing exhaust discharge replacing the outboard short stacks now used, and interior soundproofing.

► **Vickers-Armstrongs Viscount, turboprop airliner which recently went into London-Paris service for trials, features extremely large windows. Of elliptical shape with major axis vertical, each is an escape port opened by a large plastic handle at the edge of the frame.**

► **Second prototype Airspeed Ambassador has installation of Decca Flight Log, a graphic navigational system. Presentation of flight path is made by moving stylus which marks an area map mounted on a rotating drum. Flight plan of Ambassador from home base at Christchurch to Farnborough was on display, included field circuit and approach. System will bring plane down on runway, needs no additional landing aid equipment, says Decca.**

► Westland Wyvern carried a torpedo which had an unusual additional tail assembly, presumably for stabilization of the fish during drops from higher than usual altitudes. Vertical fins are fitted at the extremities of a horizontal surface which has a control surface on each side. A transparent "beavertail" housing contains what appears to be control equipment which actuates the surfaces on the horizontal plane. From appearance, this additional tail breaks off upon entry into the water.

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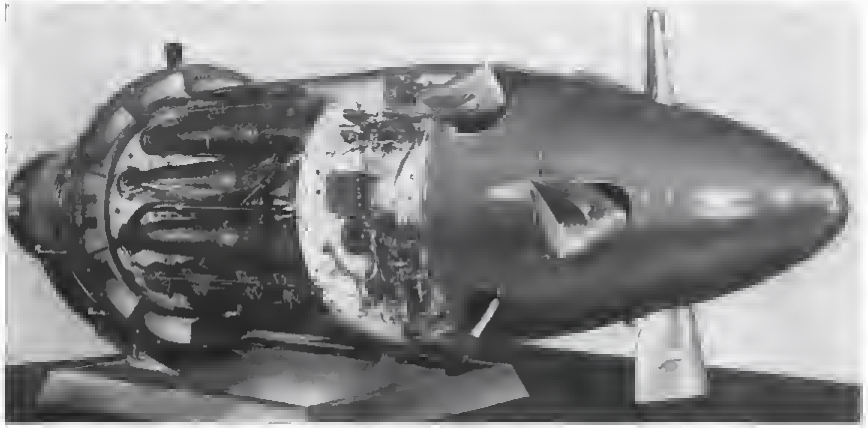
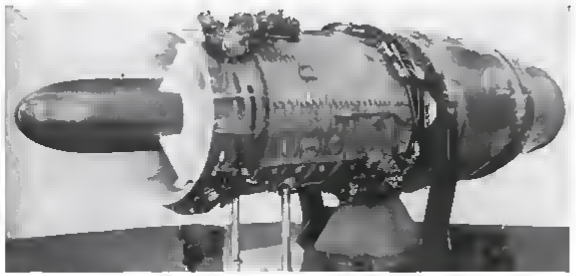


PYTHON, larger and heavier than U S turboprops, doesn't develop as much power; so sales prospects for this engine are dim

Sapphire Strengthens Wright's Jet Bid

Military orders for powerful engine are expected soon.

By Alexander McSurely



SAPPHIRE, star of the C-W AS deal, is a strong prospect for U S. military orders.

First U S military orders for airplanes powered by American built 7200-lb. thrust Sapphire turbojet engines will be coming along soon, Washington sources predicted last week. The forecast followed announcement by Curtiss-Wright Corp. that it was buying American manufacturing rights to the Sapphire from Armstrong Siddeley Motors Ltd., Coventry, England.

Reliable British sources said that the figure paid for the Sapphire "ran into millions of dollars" but no exact amount was disclosed.

The Sapphire has the highest dry rating of any turbojet engine known to be flying. Nearest competitors, according to manufacturers' announcements, are the Canadian Avro Orenda rated at 6500 lb., the Pratt & Whitney J-48 and its British counterpart the Rolls-Royce Tay, rated at 6250 lb., and the Rolls-Royce Avon, rated at 6000 lb. thrust (higher ratings claimed for these and other engines now flying are with water injection or afterburner).

▶**Three Turboprops**—The Curtiss-Wright agreement with Armstrong Siddeley also included the American manufacturing rights to these three Armstrong Siddeley turboprop engines along with the Sapphire:

- **The Mamba** rated at approximately 1400 hp.
- **The Double Mamba** rated at approximately 2700 hp.
- **The Python** rated at approximately 4100 hp.

Newest and hottest of the four engines is the Sapphire, but lack of American turboprop competition in the lower horsepower range makes the Mamba a likely prospect for American production also.

Forecast of U S. military orders for Sapphire-powered planes is founded largely on the assumption that Curtiss-Wright would not make the large-scale financial commitments involved in the British deal without a good indication that the world's biggest aviation customer, the U-S. Department of Defense, was interested.

AVIATION WEEK's London correspondent Frederick R. Brewster cabled last week that the contract had not yet been finalized.

British Government approval on the contract was still awaited, but was expected without objections.

▶**Buttoning Up**—Brewster said that H. T. Chapman, managing director of Armstrong Siddeley, was leaving last week for New York where the final details of the contract would be buttoned up. He said that the negotiations had been initiated by Armstrong Siddeley on the basis of pooling experience and facilities of both companies to develop existing designs, in order to get utmost power at the earliest date.

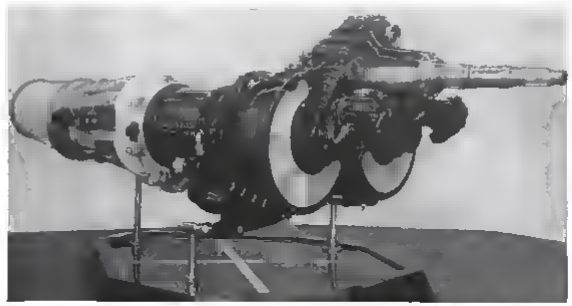
As Curtiss-Wright's old competitor, Pratt & Whitney, once learned when it made a similar licensing agreement with British Rolls-Royce, the initial cost of licensing is by no means all the expenditure involved in getting the engine into production.

But like Pratt & Whitney, Curtiss-Wright appears willing to pay the price if it means a long stride toward catching up with current state of gas turbine development in this country.

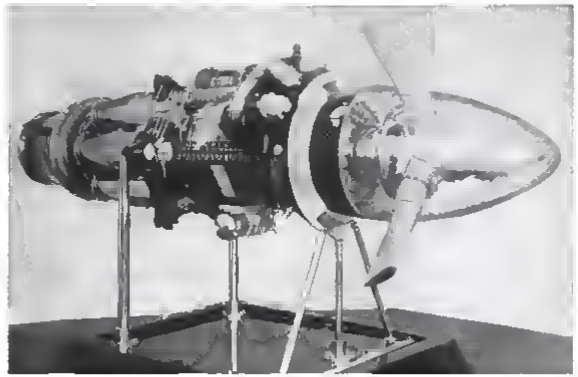
▶**Problems Ahead**—Translating British engineering drawings and terms into their American equivalents, substitution of American accessories and fuels, and redesigning where needed to avoid critically short materials, are some of the problems to be faced. Redesigning to take advantage of some American machine tool shortcuts will also, doubtless, be a factor in the changeover at the big Wright Aeronautical plant at Wood-Ridge, N. J., where the new jet is expected to be manufactured.

If Curtiss-Wright could start rolling Sapphires off the line tomorrow it would be in an excellent competitive position. There would be a good chance to assume leadership on the basis of the Sapphire's high performance, already demonstrated in flight.

But the four main competing American companies in the aircraft gas turbine field—General Electric, Allison, Westinghouse, and Pratt & Whitney—are all pushing full speed ahead on developments of turbines which will have higher performance than the Sapphire. Some of these engines are now running on test stands, although none are known to have flown. If some of these can be hurried through flight tests and into production before Curtiss-Wright gets too far along with the Sapphire, the newest American-British engineering tie-up may not prove quite so profitable.



DOUBLE MAMBA gives nearly as much power as T-38, and has all twin engine advantages.



MAMBA has no U. S. competitor in its power class, so may be an attractive article.

▶**Performance**—Here are the available details on the Sapphire's specifications and performance:

- **It recently** completed a 150-hr. service-type test at 7200 lb. static thrust.
- **Specific fuel consumption** is quoted at 0.916 lb./hr./lb. thrust at sea level at 7200-lb. thrust.
- **Dry weight is 2500 lb.**
- **Dimensions** are 35¼-in. diameter, 133¾-in. overall length and 6.8-sq. ft. frontal area.

From a weight, length and diameter standpoint it will be seen that the Sapphire could be fitted into almost any American military aircraft now using the Allison J-35 or General Electric J-47 axial flow engines, with only a reasonable amount of modifications, yet supplying nearly 2000 lb. more thrust than has been officially quoted for either of these powerplants.

▶**Where It Fits**—Planes now in production using Allison J-35 engines include, Northrup F-89, Republic F-84E. Planes using the GE J-47 include Boeing B-47, Martin XB-51, North American B-45, North American F-86, and Convair B-36D.

Sapphire flight experience began last January when two of the engines were first flown in a Lancaster flying test bed. More recently two Sapphires have been fitted into a Meteor 8 airframe, which performed sensationally at the recent SBAC show at Farnborough.

▶**Metrovick Developments**—Original Sapphire was developed by Metropolitan Vickers Electrical Co., Ltd., and purchased in early development by Armstrong Siddeley. Like the earlier Metrovick Beryl gas turbine, the Sapphire has a single annular-type combustion chamber.

This engine is said to use the unique Armstrong Siddeley prevaporizing fuel system.

The Python, biggest British turboprop, was developed from the first gas turbine, and is considerably heavier and larger in diameter, than the two more powerful American turboprops that are now flying—the double turbine Allison T-40 rated at 5500 hp., with 40-in. diameter and 2500-lb. weight, and the Pratt & Whitney T-34, rated at 5700 hp. with 30-in. diameter and 2550-lb. weight. Because of stiff competition and a complicated reversal of air flow the Python is not expected to stand much chance of further American development.

▶**Mamba Is Chance**—Mamba offers much more interest as an American powerplant.

The Mamba fits in a niche below the Allison T-38 turboprop in power and weight in the single version.

The Double Mamba weighs considerably more than the T-38 (2000 lb.

to 1250) and gives very close to equivalent performance with advantages of twin engines over single turbine arrangement.

► **Shipping Engines**—Final details of the engineering agreement were expected to be concluded last week or early next week by Roy T. Hurley, Curtiss-Wright President and Mr. Chapman, in a New York conference. Arrangements to ship models of the engines to Wright Aeronautical's plant at Wood-Ridge for study are being completed.

As part of its engineering cooperation Armstrong Siddeley will make available the facilities of its testing center for engines and propellers at Ansty, described as the largest in England, and in turn expects to benefit from Curtiss-Wright engine and propeller research, in this country.

► **Success Story**—Example of what the Curtiss-Wright Sapphire venture might lead to, if American production is achieved speedily enough, is seen in the Pratt & Whitney jet experience.

Before security clamps were placed on engine contracts in June, Pratt & Whitney had over 500 orders for its American J-42 and J-48 developments from the Rolls-Royce Nene and Tay engines. More orders since then have probably multiplied the June orders several times. Yet Pratt & Whitney started "cold" with the purchase of the Nene manufacturing rights in 1946, with no previous jet production experience.

Contrary to some reports, Pratt & Whitney and Rolls-Royce are continuing their engineering interchange of information on the two centrifugal-flow jet engines, although they are going their separate ways in new axial-flow engine developments.

Barring worse war conditions, tetraethyl lead content of commercial aviation gas may remain at the present economic level of 3 cc. per gallon. By this week's end, PAD expects to have a comprehensive report on U. S. aviation fuel capacity.

► **Waste and Inefficiency**—Higher lead content is bad for engines in several ways, according to extensive tests by airlines, engine companies, oil companies, and military technicians.

Fuel consumption rises 1.5 percent when the lead content goes up from the commercial level of 3 cc. per gallon to the military 4.6 cc., airline analysis shows. Interior Department had planned to gain 10,000 bbl. of high octane daily by raising lead content of commercial fuel to 4.6 cc. per gallon, and lowering volatility specifications.

But nobody figured the fact that the lead increase will mean a loss in unit fuel consumption of about 7000 bbl. So the net change would be only 3000—before allowance for other inferiorities.

Volatility reduction called for in military specs means an 8-10 percent richer mixture is necessary in conventional engines—causing further waste.

► **Maintenance Trouble**—According to airline technical studies, increasing aviation fuel lead content will mean:

- **Overhaul life** is shortened 16-50 percent.
- **Spare engines** needed will increase 20-25 percent.
- **Spark plug removals** will go up 65-76 percent.
- **Premature engine removals** will rise about 75 percent.
- **Plane hours** available will decline 1.5 percent under present scheduling. And increased tightening of schedules due to semi-mobilization means plane availability actually would go down even more than 1.5 percent. The increased maintenance made necessary by the highly leaded fuels would throw the airlines' normal maintenance schedules out of kilter.

► **Dangerous**—Poorer maintenance control means more in-flight engine failures.

- **Plug fouling** will cause more failures at the critical takeoff. Plug fouling also will put more fatigue on engine, propeller, and hub due to operating more hours with one cylinder out.
- **Sludge** in torquemeters will cause abortive takeoffs due to malfunction of the auto-feathering mechanism of some propellers.
- **Sludge in crankcase** will increase chances of bearing failures and clogging of two-speed supercharger clutches.

► **No Use Changing**—From these facts, Air Transport Assn. concludes in a report to Interior Department:

- **Evil effects** of the proposed changes on airlines will completely nullify the theoretical aviation fuel savings.
- **Other ways** of getting the necessary alkylate production must be tried. Two methods are to raise refinery output by extraordinary methods, and to cut motor fuel octane rating from 90 (premium)—80 (regular) to 75-70.

By Nov. 1, Interior's PAD hopes refiners can be on the way to an output that will ease the present shortage.

Once we start gaining back the lost inventories taken from the West and East Coast for the Korean emergency it means the shortage is over, the government says.

But the estimated 25,000-bbl. increase needed will require special steps by PAD, say PAD director of aviation gasoline A. P. Frame and his assistant, T. L. Appohn.

► **Government Steps**—Refiners have the necessary alkylation equipment to raise output quickly, but they do not have the supplies of special ingredients to feed the equipment. The needed feed stocks are butylenes, isobutane and codimer. If they get enough of these, they believe they can raise alkylate production by November. Switching plant facilities will take longer—until about January.

PAD will help rush shipments of feed stocks to refiners. And the extra cost will be paid by government buyers (military would permit compensatory rise in price of its gasoline), according to Interior Secretary Oscar Chapman.

PAD queried refiners on Oct. 4 asking: How much can you raise your aviation gasoline production? How much alkylate feed stock have you on hand? How much more do you need to reach your equipment's capacity? How much would this cost, or raise price of the finished product?

► **Still Not Sure**—If increased supply of feed stocks does not do the trick, PAD will take more drastic action. They may have to pay premiums for extra-high quality base stocks of petroleum derivatives. This would increase the aviation gasoline yield from the catalytic cracking processes—at a price.

Final resort might be either to cut motor fuel octane rating, or raise lead content of airline aviation gas, or both.

ATA and other industry people are encouraged lately by the let up in government talk about "doing something drastic." It begins to look as if there will be enough production increase.

The Civil Aeronautics Board and Civil Aeronautics Administration both backed the airlines' stand against increased lead content in their gasoline. If shortage persists, there have been signs that Interior may be prepared to take political chances by cutting motor fuel octane ratings before changing airline fuel.

Aircraft engine manufacturers and oil companies refuse to comment on what should be done—cut motorists' octane or put more lead in airline fuel. They are caught in the middle. But they know the statistics offered by the airlines—since they helped conduct the very tests they are based on.

► **Squabble Settled**—The Interior-airline fuel controversy started in mid-September. An Interior official informed industry representatives there was an acute aviation gasoline shortage and one of the quickest ways to fix it was to put more lead in airline fuel.

A week later, industry experts gathered in Washington and heard a military "technician" announce that more lead would have no adverse effects on engine operation. The group ignored this and proceeded to gather facts showing how seriously adverse 4.6 cc. lead content is to engines—especially high-performance engines. Other Air Force engine specialists backed these facts.

Airline representatives then told the Air Force: "If you think you need to change commercial specifications you may so advise but please make sure government officials know that you and we both suffer from highly leaded gasoline."

Fuel Outlook: More Gas, Less Lead

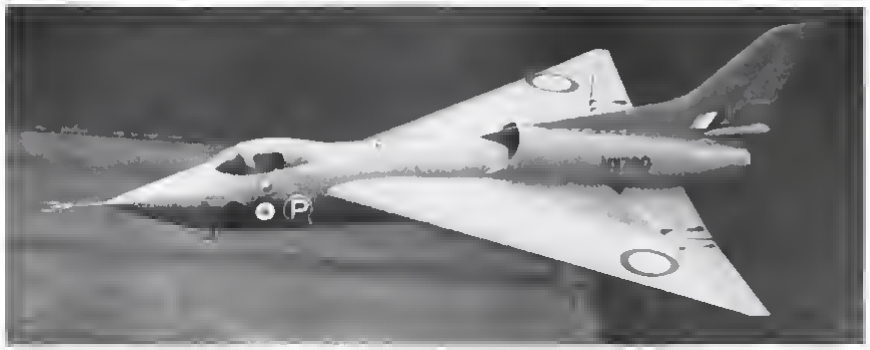
Estimates of refining capacity now indicate that the industry can meet needs without changing quality.

Mounting estimates of U. S. oil refinery capacity indicated last week that a lowered standard for civil aviation fuel might not be needed after all.

Meanwhile airline representatives had submitted a formidable case to the Department of Interior, showing the disadvantages of using proposed higher-leaded fuels for commercial aviation operations.

Interior had been considering an order to oil companies to manufacture all aviation gasoline at the military standard requiring 4.6 cc. of lead per gallon. That had been proposed as the easiest way for oil companies to meet the current overall aviation fuel supply shortage. Raising the lead content permits lowering the amount of alkylate, key and scarcest ingredient of avgas.

► **More Capacity**—Now, first reports by oil refiners to Interior Department's newly formed Petroleum Administration for Defense indicate they can meet the government goal of a 2.5,000-barrel-a-day raise in aviation gasoline.



ALONGSIDE THE AVRO DELTA

The trim Avro 707B delta-wing research single-seater shows off its noteworthy design configuration during a test hop. It is believed that lessons learned from flying this wing design will be applied to a bomber projected by the company. The slotted elevators (inboard) and ailerons are of interest. The bulge at the base of the rudder houses an anti-spin chute which can also be used for cutting landing run. Power is supplied by a single Rolls-Royce Derwent centrifugal-flow turbojet. Lengthened nose, redesigned cabin for ejection seat, and increased vertical fin area are most marked changes over previous 707.

Navigation Aids Hit By CAA Budget Cut

Radar air navigation aids and federal airport aid will bear the brunt of budget cots imposed on the Civil Aeronautics Administration's 1951 fiscal year budget, which last week came back to the agency from the Budget Bureau fixed at $213,523,502.

The total slash amounted to approximately $18 million, and was imposed as part of the overall cot ordered by Congress when it voted passage of the 1951 Federal Omnibus Appropriation Bill.

The airport program was chopped $15.5 million, leaving $21.2 million still available for 1951 projects. Breakdown on how airport cuts will be made will not be available for several weeks, a CAA spokesman said.

The federal airways program sustained a $2.5-million cut. Total airways expenditures under the reduced budget will amount to $41 million.

Lost from equipment scheduled to be purchased under a tentative 1951 program (AVIATION WEEK Sept. 18) are five of ten airport surveillance radar, all seven precision approach radar, and four high intensity approach light lanes out of 13 scheduled.

Also dropped from the list are five of 12 VHF automatic direction finders for use with airport surveillance radar.

Here is the list of major equipment items under the revised CAA budget for airways in 1951:

- 5 airport surveillance radars, total cost of over $1 million
- 20 VHF omniranges, over $1.3 million
- 9 high intensity approach light lanes, $400,000
- 7 VHF ADFs for use with ASR, $135,000
- 6 VHF ADFs for use at air route traffic control centers, $120,000
- 12 mechanical interlock systems, $470,000.
- Point-to-point VHF communications in Alaska, $2.9 million

More Money Asked As Dollar Shrinks

New supplemental budgets, now in preparation by Air Force and Navy to offset the rising costs of military aircraft procurement, are expected to add another $1 billion to the 1951 budget.

Appeal for the additional funds was made before the House Armed Services Committee by Air Force Undersecretary John A. McCone. He declared in answer to questioning that price rises in the few months since April 1950, alone, had already cut USAF buying power by the equivalent of 750 North American F-86 fighters.

Illustrating cost increases as they relate to procurement, he cited rises of 128.9 percent in crude rubber; 2.9 percent in aluminum, 23.6 percent in copper, and, 32.9 percent in tin. These rises will also inevitably be reflected in wage rises which again will affect the procurement picture, McCone said.

Using rule-of-thumb measure, Committee Chairman Carl Vinson estimated that the USAF drive to add some 4400 new planes by 1952 had been hit by cost increases in source items running

between $315 and $360 million.

"Let's not kid ourselves. Congress has a choice of seeing these programs cut, or coming up with additional appropriations to meet these rising costs," Vinson said.

Air Force sources making more careful analysis of what would be needed to offset increased procurement costs determined a figure nearer to $550 million, to be added to the total 1951 budget.

Navy sources reckoned their funds need to maintain planned '51 procurement would approximate $400 million. Both services agreed that to maintain presently planned procurement levels a special supplemental budget would have to be authorized before Jan. 1, 1951.

Meanwhile the Joint Chiefs of Staff is considering a program which would raise the Air Force group ceiling to 100 by July 1, 1954. This would require an estimated $20 to $30 billion in fiscal 1952 funds over the already doubled fiscal 1951 appropriations.

The proposal still under consideration by the Joint Chiefs must go to the Bureau of the Budget before being submitted to Congress. Current thinking is that the Joint Chiefs may now lower the ambitiously conceived group ceiling to 85 operational by 1954.

Aircraft Freight Bill Slash Is Snarled

Red tape is snarling the Justice Dept.'s move to slash the aircraft industry's rail freight bill, AVIATION WEEK has learned. At stake is an estimated $10-$15 million a year which could be saved by cutting present rates for hauling planes and parts.

Charges of exhorbitant and discriminatory rates are made in a consolidated case filed by Frank Vesper, chief of the Justice Dept.'s Transportation Reparations unit, which makes 17 separate reparations claims.

The Interstate Commerce Commission, despite urgings of the Justice Dept. and the Aircraft Industries Assn., has refused to pull out for separate consideration the section dealing with overpayments made by the government on plane and parts shipments.

As the defense expansion program gets underway, it was pointed out, the overpayment on plane and parts shipments will rocket upward. Airframe manufacturers will turn increasingly to subcontractors for parts, expanding shipments from subcontractors greatly.

AIA will move to speed action by filing a separate case with the ICC, a spokesman said.

▶**Shipping Now Easier**—Rail rates on planes and parts have been changed little since they were set in the early days of aviation. Then, planes and parts were light, fragile, and difficult to handle, and packaging was virtually unknown. There has been no reduction in rates since 1932, although packaging of aircraft materials has been greatly improved.

Discrepancies in rail rates on airplanes and parts which AIA and Justice are seeking to have corrected are:

• **The class rate** on airplanes and parts is now 1-25 times the first-class rate. The only other shipments charged this rate are such fragile and time-consuming items, as artificial limbs, balloons, radar housing, antenna enclosures. A reduction in the rate to a second-class rate, or 85 percent of the first-class rate, is being requested. This would reduce a $282 bill on a shipment from Detroit to Ft. Crook, Neb., to $191.

• **The commodity rate** on planes and parts of $5.45 a hundred lb., Justice claims, should be reduced to $5 per hundred, which is still slightly higher than the rate applying to auto parts.

• **Packaging weight**. Manufacturers have been penalized for perfecting packaging and making aircraft parts an easy cargo to ship. Out of a 10,000 lb. carload shipment, for example, only 2000 lb. might be parts, and the remainder wood and metal used in the packaging. Yet the high 1.25 times-first-class rate is applied to the packaging.

• **Claims**. Furniture, which is comparable to aircraft parts as a cargo, is charged second-, third-, and fourth-class rates. Yet a study by the AIA showed that while railroads paid only half a cent on every dollar of revenue on plane and parts shipments in claims for damage, loss, etc., the rails paid out 20 cents on every dollar of revenue from furniture shipments in claims. The extremely low rate of claims paid on airplane and parts shipments, AIA points out, is another argument for reduction in the rates applied to these shipments.

PULLING A B-36 WASP MAJOR

A Convair B-36, contracted for in 1944, has a 3½ ton P&W R-4360 engine removed at San Diego. The crane being used is a one-man ten ton unit built by Unit Crane & Shovel Corp. of Milwaukee, Wis., and is one of several that are employed by Convair to transport plane components from one plant to another.

Senate Unit Picks Subsidy Quiz Group

Appointment of Ernst and Ernst, accounting and management firm, to make a survey and audit of U. S. domestic airline operations by communities for the Senate Committee on Interstate and Foreign Commerce was announced last week by Sen. Edwin C. Johnson, chairman of the committee.

The firm was selected from seven bidders, to make engineering and accounting studies and analyses to determine "the most accurate and practical method" of constructing profit and loss statements by individual airline stations. The committee has asked for recommendations for revisions in the CAB uniform system of accounts, allocation formulas and procedures to prepare the profit and loss statements periodically, and to determine airline subsidy requirements in relation to the statements.

Ernst and Ernst will be asked to apply the procedures it recommends to the operating records of each domestic U. S. air carrier for the calendar year 1949.

Sen. Johnson called the survey "the most significant study of domestic air transportation that has been undertaken by a Senate committee. Upon its success will depend the manner in which Congress will continue to support our vital and growing commercial air transportation system," he said.

Representatives of Ernst and Ernst and of the committee's staff will call on each airline for records and assistance in making the survey.

FINANCIAL

Will CAB Let Delta, NEA Merge?

Board must find it 'desirable'; only one domestic combination has passed this test since 1938.

The proposed Delta-Northeast merger (AVIATION WEEK, Oct. 9, p. 52) promises considerable controversy before it runs the complete gantlet of proceedings necessary to obtain Civil Aeronautics Board approval.

The proponents of the merger claim that this combination is the "most logical" proposed to the CAB in recent years, because it not only strengthens present local service in the two areas, but "makes possible an expedited service connecting these two regions, with both networks contributing to a strong system."

▶**Getting to a Point**—This is the first merger ever advanced in modern airline history where the two carriers do not even meet at a common point. Its advocates would remedy this by "closing the gap" between the respective systems.

The contention is made that this combination would help both companies to achieve more equally balanced traffic loads throughout the year, since Northeast has its peak season in summer when New Yorkers flock to New England resorts, while Delta has its heaviest traffic in the winter to New Orleans and other southern points.

The basis of the merger would be an exchange of Northeast stock for Delta stock in a ratio based on the book value of the two companies. At last reports, Northeast's book value was around $3.40 per common share while Delta showed a book valuation of $15.11 per share. These prices would indicate an exchange ratio of around 4.5 for 1. Market quotations of the two equities are not far removed from book valuations at the present time.

The proposed basis of exchange also marks the first instance where no attempt has been made to impart an additional price for the intangibles such as the franchise value of the permanent certificates of public convenience and necessity.

Northeast has been a willing candidate for a merger with another carrier for sometime now. A Capital-Northeast proposal made considerable headway when it was recommended for approval by a CAB examiner in August, 1946. But, the deteriorating finances of both airlines during that period led to the voluntary withdrawal of the proposal. Subsequently, Northeast has had flirtations with Eastern, Colonial and one or two others without any conclusive results.

▶**Atlas Control**—Effective control of Northeast rests with the Atlas Corp. which owns about 95 percent of the airlines preferred and more than 20 percent of its common stock. In view of its control of Consolidated Vultee Aircraft Corp., Atlas has been directed by CAB to divest itself of its Northeast interest in excess of 3 percent of all outstanding stock. This divestment was originally ordered to be completed by Oct. 23, 1949. In view of the difficulty in finding a suitable buyer, however, this date was extended for one year. It is likely that the Board will permit a further extension while this merger proposal is being heard.

For its part, Delta has long sought a direct connection to New York City. For years it has applied for a route to that city connecting with its system further south. Its latest application is for a route connecting Columbia, S. C., to New York via Fayetteville and Wilson, N. C., Washington, D. C., Philadelphia, and Newark.

▶**Door to New York**—This merger proposal will be construed as another Delta attempt to obtain an entry into New York. This may be expected to bring on strong opposition not only from Eastern and National, operating along the East Coast, but from American as well. A New York terminal would make Delta a formidable contender for traffic between that point and Dallas, Tex., now a prize route of American.

Delta has also figured importantly in previous merger discussions. The most prominent revolved around a combination with National when that carrier was experiencing difficulties a few years ago due to its strike. Capital was also mentioned as a possibility at the time in a three-way deal. All of these negotiations, however, fell through.

Even under "normal" conditions, the airline merger path is a most intricate one, beset by many obstacles. The Delta-Northeast proposal becomes more involved through the lack of common terminals.

▶**Many Tries, One Hit**—Many mergers have been attempted, but only one domestic combination has been effected since the time commercial aviation came into its own with enactment of the Civil Aeronautics Act of 1938. This lone exception occurred earlier this year, when three Rocky Mountain area feeders were combined, as of June 1, 1950, into a single operation with CAB approval. The carriers involved were Monarch, Challenger and Arizona. Temporary certificates of public convenience and necessity were involved in this instance and may have been a facilitating factor in effecting this combination.

For the trunklines holding permanent certificates, the hurdles have been many and complex in attempting to effect desirable combinations. Physical assets are not difficult to appraise. Placing a price on a "franchise" is a troublesome issue, and many a past proposal collapsed in the attempt. The Delta-Northeast plan seeks to avoid this pitfall by confining the basis of exchange solely to book values. But formidable obstacles of other types remain.

CAB approval is required in any consolidation, merger, lease, operating contract or acquisition of control of any certificated carrier. The Board must find that such proposed arrangement is in the public interest before it can become effective. The law directs the Board not to approve any arrangement which would "result in creating a monopoly . . . jeopardize another air carrier not a party to the agreement."

It is this directive which may serve as a rallying point for the strong objections likely to be lodged by Eastern, National, American and probably other carriers as well.

▶**Why They Failed**—Previous merger proposals stumbled and failed to obtain Board approval for a variety of reasons.

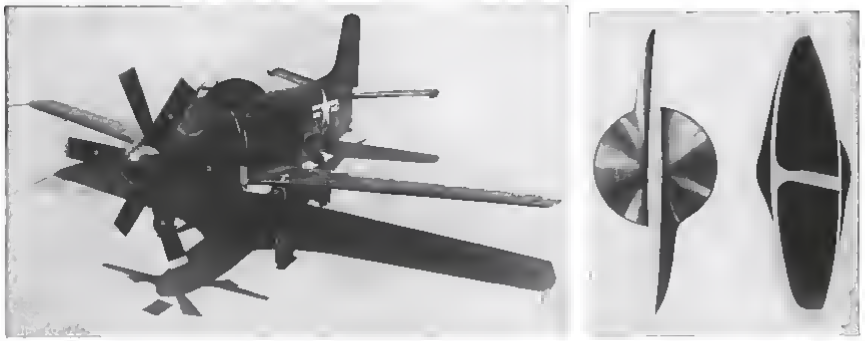
After approval by a special CAA examiner, the Authority (the Board's predecessor) in 1940 denied United's application to acquire Western. Main reason given was that the size and control of United would adversely affect the competitive position in that area.

American attempted to acquire Mid-Continent through an exchange of stock. The proposal was turned down by the Board in 1946 on the grounds that it would merely add to American's bigness, and no community of interest existed between the carriers.

From time to time, members of the CAB have expressed their encouragement of "desirable" mergers. No specific combinations, however, were volunteered as meeting the objectives of the Board.

By its very nature and implications, the Delta-Northeast proposal is bound to result in a protracted and a heated proceeding before the Board. Regardless of the ultimate outcome, it is possible that a clearer concept of the Board's philosophy on mergers may result.

—Selig Altschul



A2D sports Aeroproducts prop. Compare the thin chord of supersonic blade (left side of right hand picture) with a conventional blade.

Tomorrow's Props: Very Thin and Fast

Aeroproducts will test its supersonic prop in new spin test facility at Dayton.

By Alexander McSurely

Dayton—A small diameter propeller that will be run at very high rotational speeds—up around 4000 rpm—will be the Aeroproducts entry in the highly competitive supersonic propeller race which is now lining up. Many details about the Aeroprop supersonic design are restricted since it is being developed under Air Force and Navy contracts.

But these facts are known:

- Like other supersonic blade designs being developed by competing companies, the new high speed Aeroprop has a very thin blade, almost like a razor blade at the tip.
- Unlike any other supersonic blade designs this observer has seen, the Aeroprop has a planform which tapers toward the tip.
- The small diameter, three blade, single-rotation propeller, operating at very high engine rpm, will be able to absorb as much engine horsepower as a much larger, multi-bladed, dual rotation prop, at the relatively slow rpm which is standard for propellers of subsonic designs.
- Probably the most significant thing about the Aeroprop design, however, is the tapered blade. By use of taper, Aeroproducts engineers have attained a certain amount of sweepback on the leading edge of the blade. This is a marked advantage for any airfoil traveling in the transonic speed region, according to Aeroproducts engineers.

Principal objection to other swept-blade propellers has been the structural unbalance in a swept blade which retains constant width to its tip and the consequent higher stresses which are imposed. Taper eliminates this structural unbalance and the resulting excessive stresses.

But this isn't all pure gain. Engineering isn't that simple. Effect of the narrow tip chord on the ratio of blade thickness to chord, which most propeller theorists consider a very important factor in supersonic blades, is something to watch out for.

A wider blade can be thicker at the tip, and still maintain a thickness ratio which only an ultrathin tapered blade can match. The fact that the Aeroproducts designers have picked this form as the best engineering compromise indicates that they must gain more out of the sweepback than they sacrifice in thickness ration.

▶**Tests Next Year**—Aeroproducts division of General Motors Corp. plans to test its first supersonic propeller prototype early next year in a specially designed spin pit now nearing completion at its plant at Dayton Municipal Airport.

But already R. R. LaMotte, chief engineer, and his staff have obtained sufficient data in wind tunnel tests at Cornell University Aeronautical Laboratory and in other trials to justify their calculations showing that the high level of efficiency of propellers at subsonic speeds can be continued through the supersonic range without serious losses.

The most logical way to make a very thin blade of any kind, which will stand the stresses that a supersonic propeller has to bear, is to make it solid, of very-high strength material—probably a very strong steel alloy, titanium, or some other high-strength metal.

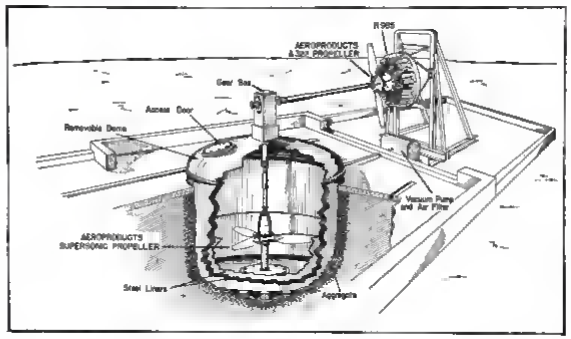
But the Aeroproducts technical staff isn't ready to talk much about that point yet—because of security and because they aren't eager to pass on exact information to their competitors.

▶**Testing Technique**—The new spin pit illustrated here has been developed under Navy contract as a test facility for the forthcoming propellers. It is a steel cylinder 12 ft. 10 in. in diameter and 7 ft. 10 in. high, sunk below ground level and fastened to a heavy concrete base with an airtight seal. A heavy steel dome fits over the top of the cylinder and is raised for installation and removal of the test propellers.

After the propeller is sealed in the chamber, a vacuum pump goes to work drawing out the air. When only 0.01 atmosphere remains the chamber is ready for test.

At this very low air pressure the propeller can be whirled at high rpm with relatively low power. A shaft, extending vertically downwards through the dome, rotates the propeller hori-

CONVAIR XP-81 with Aeroproducts propeller made first turboprop flight in the U S



NEW SPIN PIT was developed under Navy contract to test supersonic props

zontally in the chamber. A right-angle gear box above the dome transmits power to the propeller shaft from another shaft driven by a 450 hp. Pratt & Whitney R-985 Wasp Jr. engine.

A conventional subsonic Aeroproducts hydraulic propeller mounted on the engine acts as an engine load, cooling fan and governor.

First plans for the spin pit call for mechanical testing only, but it will be possible later on, by the use of a higher-powered engine and suitable gear box, to test propellers at various atmospheric pressures, simulating various altitudes, and to obtain further data on supersonic blade performance under varying conditions.

Max M. Monroe, Aeroproducts general manager, points out that the present stage of development is the outgrowth of continuous research on high speed propellers since it became known that supersonic airfoils were practical, about the time of the first jet-powered aircraft. It was that research which led to the Navy and the Air Force decisions to give development contracts for supersonic propellers to Aeroproducts.

In addition to refinements of propeller design, high power is necessary to achieve supersonic flight in a propeller-driven plane. Along this line, Monroe cites Aeroproducts experience with turboprop powerplants. Among them are the propeller for the first U. S. turboprop plane, the Convair XP-81, the propellers for the XP5Y-1, Navy multi-engine patrol bomber, the propeller for the Douglas A2D Navy attack bomber, and the props for the forthcoming first American commercial turboprop plane, the Convair 240, modified as the Allison Turboliner.

Avionics Package For Lightplanes

VHF communication and radio navigation equipment and controls have been combined in a single, lightweight package for personal plane users by the National Aeronautical Corp., Wings Field, Ambler, Pa.

The firm's engineers, after a year of intensive design work, have managed to squeeze into one 7½ lb. box a VHF transmitter, receiver, omni converter, course selector, to-from and left-right meters and a tone filter amplifier. They call it the "Omnigator."

For an added bonus, engineers say they have improved the receiver and transmitters and increased the accuracy of the omnirange. The unit with all controls on a single panel reportedly is easy to read and install.

Here's what Narco's new radio treasure chest contains:

- **Eight-channel,** high power VHF transmitter.
- **Tunable VHF** high performance receiver.
- **VHF visual aural** range navigation.
- **Tone comparison** localizer approach navigation.
- **Phase comparison** localizer approach navigation.
- **A 75mc.** marker beacon receiver.

The power supply for the device is designed to be remotely mounted on the firewall or under the seat. According to Narco, greater sensitivity and stability have been achieved in the Omnigator through specially designed circuits and components. The manufacturer says the omni equipment compares favorably with units meeting airline specifications. It has a course width (meter scale length) of about 30 deg. The marker-beacon receiver has a sensitivity equal to or exceeding Army specifications, the company says.

▶**Specifications**—The Omnigator uses 23 tubes plus 2 selenium rectifiers and 6 germanium diode rectifiers. The VHF transmitter has a high-power output and modulation in excess of 90 percent with a frequency stability factor of ± .01 percent. It has an eight-channel frequency range between 121.5 and 122.9mc. The receiver has a sensitivity of 1 microvolt and selectivity of 90kc nose width with 60db attenuation on adjacent 200kc channel. It is temperature-compensated for tuning stability.

The streamlined control panel is made of acrylic plastic and is edge lighted, making all controls visible for night flying. Total weight of the equipment, including antenna and cables, is 18½ lb. Dimensions of the 7½ lb. Omnigator box are 4¾ x 6¼ x 10¼ in. The separate power modulator supply unit measures 5⅜ x 5⅜ x 7⅜ in. and weighs 6¾ lb.

Turbojet Controls Analyzed by NACA

The addition of an afterburner to a turbojet engine augments the thrust—but it also augments the control problem. Never a simple analysis, the design of suitable control systems for turbojet engines has taken on additional complexity because of the additional degrees of freedom added.

Further, both engine speed and temperature must be measured and controlled accurately if the combination engine plus-afterburner is to give safe operation with maximum performance.

To aid control designers, the National Advisory Committee for Aeronautics has recently issued Tech. Note 2183, "Analysis for Control Application of Dynamic Characteristics of Turbojet Engine with Tail-Pipe Burning," by Melvin S. Feder and Richard Hood. Both authors are associated with the Lewis Flight Propulsion Laboratory at Cleveland.

▶**Engine First**—Before consideration of the control problem, the first approach consists of evaluating the engine dynamic characteristics. Studies of that problem show that dominant characteristics of gas turbine engines may be expressed as functions of the slopes of speed torque curves. The studies then show that valid steady state thermodynamic relations can be extended to the transient state.

TN 2183 develops the general form of the transfer functions for the case of the turbojet engine with tail-pipe burning. From these transfer functions and engine thermodynamic relations, expressions for the relation of coefficients and time constants are derived by the authors.

Next step in NACA's analysis is to determine response characteristics of the engine, based on the coefficients and time constants developed in the previous step. These are then applied to the basic control design.

▶**Steady-State Data**—Results of the NACA study show that steady-state engine data can be used to derive the dominant dynamic characteristics of the engine-plus-afterburner. Those data can also be used to determine the transfer function relating engine speed to changes in fuel flow and turbine-outlet temperature.

Further, in applying the results of the analysis to scheduled controls NACA finds:

• A relation between exhaust-nozzle area and afterburner fuel flow that maintains constant engine speed and temperature over a range of afterburner operation.

• A relation between engine fuel flow and turbine outlet temperature that

maintains constant engine speed over a range of exhaust nozzle area.

Applying the results to the design of a closed loop non interacting control system gives the form of all the control functions and a solution for six out of a possible seven required control functions, in terms of engine steady-state data.

Italian Lightplane Shows Versatility

A new Italian four-seat personal plane, the Agusta CP 110, shows promise for doubling in duty as a trainer for military personnel.

Designed by Ermenegildo Preti, the prototype was built at the experimental shop of the Milan Polytechnic School and has just finished its first series of flight trials.

▶ **Military Trials Next**—A new series of flights of military character is scheduled at the Italian Air Force's experimental base at Guidonia.

The prototype is powered with a 143 bhp., Alfa 110 ter engine, the Italian version of the Gipsy Major powerplant.

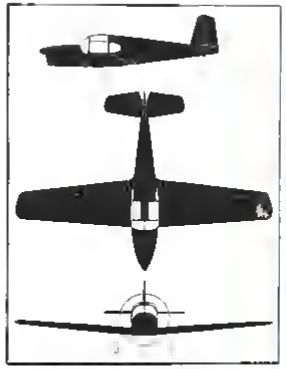
Prop is a manually operated, variable pitch Alfa Romeo unit. Production plans call for another engine of equivalent power, with an automatically controlled propeller.

▶ **Excellent Visibility**—The craft is a clean, low-wing configuration, stressing unusual visibility and room in the cockpit. Except for a narrow, overhead, solid panel, the cabin is glass-enclosed and permits an excellent view down, back and up.

In addition to side by-side pilot seating, two passengers can be accommodated on a bench-type rear seat, behind which is a roomy luggage compartment. Pilot seats are adjustable and there are full dual controls. The high roof will afford ample headroom. Cockpit panels on each side of the plane's fuselage serve as doors.

Basic Data
Agusta CP-110

Span	34 ft 5 in
Length	23 ft 11 in
Wing area	172.2 sq ft
Empty weight	1500 lb
Useful load	925 lb
Gross weight	2425 lb
Wing loading	14 lb/sq ft
Power loading	16.98 lb/bhp
Maximum speed	170 mph
Cruising speed	150 mph
Minimum speed	55 mph
Range	620 mi
Takeoff run	165 yd



AGUSTA CP-110 three-view shows the clean lines of the new Italian personnel plane. Plan view (center) shows the break in the fuselage just aft of the cabin, where the rear is mounted to the forward section by a series of bolts. Plane features exceptionally good all-around visibility.

Flying controls and undercarriage retraction are hydraulically operated.

▶ **Tricycle Gear**—Landing gear is tricycle type, with long stroke shock struts. Main gear retracts outboard and nose gear aft. The latter is steerable, automatically returning to fore-and-aft position. Absence of mechanical linkage between rudder and nose wheel is intended to provide good safety in cross-wind operations.

▶ **Wood Makeup** — Construction is wood, to overcome raw material procurement problems. Wing is a single spar structure with chordwise ribs and plywood skin. Slotted type ailerons are balanced statically and dynamically, with high rate differential controls to give full lateral controllability in very steep attitudes and overcome adverse yaw effect.

Wing root houses the fuel tanks.

▶ **Body Split**—Fuselage is a two-piece structure divided near the wing trailing edge. Connection is by bolts for quick disassembly.

The two section construction is said to make it easy to assemble or dismantle the plane. This eliminates the need for extra stiffening in the center section, and makes possible more and larger openings in the cabin.

Tail control surfaces are statically and dynamically balanced, and elevator carries a controllable trim tab.

Pilot reports indicate the suitability of the CP-110 for navigation, night and blind flying and aerobatic training in addition to its capabilities as a primary trainer. The craft could also function as a liaison plane.

GLOSTER METEOR PV, private venture ground support fighter, shown with its entire complement of external stores

Meteor PV Armed for Infantry Support

Gloster's new model has heavy armament; takeoff is improved by RATO.

By David A. Anderton

Farnborough, England—Meteor PV, latest addition to the long line of Gloster's well known twin jet craft, is intended as a front-line fighter for infantry ground support. For that purpose, it has been rigged with a collection of Sunday punches, ranging from extra cannon through rocket projectiles to 1000 lb. bombs.

The plane, developed as a private venture by Gloster Aircraft Co. Ltd., of Hucclecote, England, was shown here at the 1950 Society of British Aircraft Constructors display. Resplendent in its brilliant scarlet and cream markings, the Meteor PV was parked in the static display, its ancillaries grouped before it.

▶**For Advanced Operations**—Gloster feels that there is a need for such a specialized aircraft, and that the current fracas in Korea is emphasizing that need.

The Meteor PV is envisioned as being rapidly ferried to advance, temporary airstrips, there to be fitted with the necessary armament and immediately becoming available for ground support duties with the expeditionary force.

To do this job adequately, the fighter should have long range for its initial ferry trip, short takeoff and landing runs for operation in and out of temporary airfields, and extremely heavy and varied armament.

▶**Tanks For Range**—Gloster has fitted five drop tanks to the Meteor PV. Two, of 100 imp. gal. capacity each, are located at the wingtips in the first such installation for Meteors. Two more, also of 100-imp.-gal.-capacity, are standard Meteor underwing tanks, slung under the outer panels. One is a fuselage belly tank of 180-imp. gal. capacity, bringing the total additional fuel to 580 imp. gal.

Allowing for the additional drag and weight of the installation, this much fuel should increase the range between 500 and 600 miles.

PV AIRFRAME is based on standard Meteor 8 with only a few external changes

AMERICAN-PATTERN rocket assist units are fitted for takeoff performance boost.

Takeoff performance, normally under 1000 yd. to clear 50 ft., is improved with RATO. On the display Meteor, there were six bottles, two were located under the fuselage at the wing trailing edge, and two more on each side of the fuselage, also at the wing trailing edge. These RATO units appeared to be patterned after the American Aerojet solid-

propellant rockets, which are shorter and fatter than British assist rockets of the same thrust rating.

Gloster does not state whether all six need be fitted to get the desired performance, or whether a lesser number of assist rockets can be used, depending on load.

There is provision for an arresting hook, well forward on the airplane. It is to be used with ground arresting gear.

▶**Two More Cannon**—The normal complement of four 20mm nose cannon in the standard Meteor has been increased by a brace of 20mm cannon in a fuselage belly pack. This installation takes the place of the belly tank. Dimensions of the gun package are such that it is not difficult to see cannon of a larger caliber installed, or perhaps an automatic rocket launcher.

Gloster claims that sixteen 95-lb rocket projectiles can be carried, but the plane on display bore eight on the starboard wing and four on the starboard underside of the fuselage. Thus it would seem that 24, and not 16, of these rockets could be carried at once. A drawing of the Meteor PV in a Gloster brochure shows only four rounds on each wing, with the remaining eight in the belly position. Apparently the customer pays his money and takes his choice.

Four 1000-lb. bombs can be carried instead of the additional cannon or rockets. Two are slung under the fuselage and one under each outboard wing panel.

▶**Economical Answer**—Another clincher in Gloster's sales argument is that the Meteor's basic airframe, components and engines have been thoroughly tested and are well known as a result of tremendous service experience. This further adaption of the evergreen Meteor can result in economies in supplies and maintenance.

No performance data were available. Rudimentary information on this variant is the same as that of the Meteor 8, which is powered by Rolls-Royce Derwent engines, has a 37 ft. 2 in. span and is 44 ft. 7 in. long.

One analytical comment. Basic changes made in this airplane are all external. They could be made in the field, if tanks and packages were available. Gloster has said only, in effect, that:

- A ground attack airplane has to pack a heavy wallop (which we know).
- The Meteor can carry that two fisted wallop around (which we also know).

But they have further said that nobody has yet seen fit to think about fitting a standard jet fighter with all these ornaments and that is their purpose in showing the airplane here.

The success of Gloster's ground attack formula can only be judged by its future financial reports.

LETTERS

Automatic Pilots

Several of us at NWA have read, with considerable interest, the article by George L. Christian on autopilots in the July 17 issue of your splendid magazine.

The article is very good but we do feel that, certainly through no intentional misstatement by Mr. Christian, a couple of points should be further clarified.

We question the statement that "This is one of the few times CAA has been ahead of the airlines in evaluating a piece of equipment." For several months during the year 1947 a group of NWA engineers, pilots, and maintenance personnel devoted a considerable amount of time to analyses of competitive automatic pilots including automatic approach and including a considerable amount of flying.

The results were tabulated and summarized as regards all prime factors involving preciseness of control, fail safe features, and ease of maintenance. The results of each item of this very complete evaluation, involving many factors other than the three prime factors, were given point ratings and a final score obtained. This final score was not known until concurrence with all point ratings was obtained and final addition made.

We were very pleased and proud of this complete analysis and believe me, we had the manufacturers attempting to answer questions that they had not considered in original design. By their own admissions, they had some very tough problems to solve to obtain some of these answers.

In the conclusion to the article, NWA is stated to have 10 Boeing Stratocruisers equipped but not activated. This is not entirely true as we have had several airplanes activated for the purpose of conducting flight tests for a CAA Type Inspection Authorization of the computer without throttle control.

These flight tests were completed last fall and we received approval of the TIA on Feb. 20, 1950. We are withholding activation of the fleet pending outcome of flight tests on throttle control which we expect to conduct in a few weeks. Our 377 and 2-0-2 operations manuals have complete instructions on the use of the computer.

In addition, we have had a Martin 2-0-2 equipped since fall of 1947 and have had approval to use it to existing minimums since August, 1949.

We also had an experimental installation of a Minneapolis-Honeywell automatic pilot, including automatic recovery, installed in a DC-4 type airplane in 1946 and conducted numerous test flights at that time. That manufacturer later concluded to not enter the commercial field because of various production limitations involving numbers of units and delivery requirements.

We, therefore, feel that we have been quite active and progressive in this whole program.

Don Benson
Superintendent Aircraft Engineering
Northwest Airlines, Inc.
1885 University Ave.
St. Paul 1, Minn.

Club Insurance

We have noted with interest your articles on new insurance plans available to aircraft owners, and we call your attention to the Aero Club Insurance Plan described in our folder, which is available to those interested.

The Aero Club Plan has been designed by us as a special group insurance program for members of the Aero Club of Michigan, and we believe it compares favorably with any other group plan currently available.

The standard hull policy covers all risks of loss or damage, except while in flight. Flight coverage may be added if desired. The deductible, common to most policies, has been eliminated, and instead the company pays on all insured losses, regardless of size—100 percent is paid on losses due to fire, lightning, explosion, transportation and theft; and 75 percent is paid on all other losses.

Not only are the hull rates exceptionally low, but dividends are returned to policyholders annually, the current rate being 10 percent.

The liability cover is a simplified, single limit contract providing blanket liability coverage, with passenger liability being optional.

Liability rates are adjusted annually in accordance with our Safety Rating Plan, which enables the aircraft owner to receive cash savings for safe flying.

The Aero Club Plan has been in operation on a trial basis for slightly over one year. Reaction among aircraft owners has been very gratifying, and the favorable experience justifies our decision to continue and expand the program.

The plan described in the folder is limited to aircraft owners in the private business and pleasure and industrial aid categories, but modified versions of the plan are available to flying clubs and fixed-base operators. All participants must, of course, be members of the Aero Club of Michigan.

The attention which you have given to aviation insurance is certainly to be commended, and we hope that AVIATION WEEK will continue to spotlight this important subject.

R. M. CRAWFORD, Manager
Airway Underwriters
Ann Arbor, Mich.

From World Almanac

With reference to the table, "What the USAF and Navy Will Spend," on page 11 of AVIATION WEEK, Sept. 25:

This puts the matter so clearly that I should like to have your permission to reproduce, in whole or in part, the information here presented, in the World Almanac for 1951. Although this information is available in Washington, it obviously represents a great deal of work on the part of your staff. I do not know, at this writing, just how much we could use, but your permission would give us a start. We would run a credit line, of course.

I don't see how the industry could get along without AVIATION WEEK.

HARRY HANSEN, Editor
World Almanac
New York World-Telegram
125 Barclay St.
New York 15, N. Y.

Praise from Behncke

I have before me an article that appears in the Sept. 11 issue of AVIATION WEEK on page 46, entitled "Airline Unions Press Wage Drives." You are to be commended for the fair, accurate, and clean-cut manner in which you presented the pilots' current negotiating activities to establish a monthly mileage limitation. The way you present this problem and all its ramifications is much to your credit.

We would like to reproduce this material in the Air Line Pilot. We will, of course, give proper credit to your publication. May we hear from you by collect wire?

Thank you again for a very fine job well done.

DAVID L. BEHNCKE, President
Air Line Pilots Assn.
3145 West 63 Street
Chicago 29, Ill.

(The article was written by Charles Adams, formerly our Transport Editor, who set a brilliant record for accuracy and thoughtful writing while he was with AVIATION WEEK. He, with his wife, Marie Adams, has left us to enroll in the University of Colorado, at Boulder. We miss them both, wish them the best.—ED.)

Slick Is Booming

We've been so busy these past few months that some people claim Slick's Sales Department started the Korean war just to get a rest. But they're not resting. We are carrying tons on tons of war material in addition to our regular customers' increased volume of freight.

We don't know exactly whether they're ordering closer cutting inventories, going all out, hoarding, or what, but we have been hard put to find space in our fleet for all the freight being offered to us.

Through the first three weeks of August we hauled 3,173,805 revenue ton miles of freight with a load factor of more than 75 percent. Tommy Grace says that August is going to be a 5 million ton mile month. Hope he's right. Wasn't too long ago that it would take us more than 2 months to rack up a score like that. Right now, we carry more freight in a week than some airlines carry in a year. Of course, they haul more passengers in one day than we will ever haul, so I guess we are even.

We just put another C-46 into service a couple of weeks ago and have another one just about ready to go on the line. That brings us up to 24 planes and a personnel roster of over 700. Not bad when you consider that five years ago we were just a gleam in Earl Slick's mind.

We get more than our share of odd shipments it seems. Maybe it's because we are the ugly duckling of the glamorous air industry. We cater to the zoo and kennel crowd, the heavy manufacturer and the fashion merchant, the small plant and the large mills, the groweis and the military, the mortician and the salesman.

Just last month we had the honor of carrying 5000 pounds of raw cotton from south Texas to Chicago. The stuff was in 10 bales and was destined for Montreal, but Chicago was the only place we could make a connection for air transfer. The baled cotton was on a special deal—we're not ready to displace the steamboat. Not yet, that is.

Right now we are engaged in a big movement of drop tanks. Funny that something that is used once and then thrown away should be an airfreight candidate, but such is so. By placing them on cradles, rather than in hulks cartons, there is a slight saving over the surface method of shipping.

Used to be that you would know all our pilots by their first names but now with the increased load that has come our way you are hard put to remember the names of all the pilots. I just heard the other day that some of our pilots, with slightly less than one year's seniority are already checking out for a captain's berth! Maybe there's something to this airfreight after all.

What with the shortage of space in our planes, we now find that in order to send our own company material—which rides on a Space Available basis—to our stations, we have to send it by truck! No fooling. In order to take care of our regular customers both the military and the manufacturer we have to utilize the services of other transportation to get our own parts and spares around to our own bases.

ROBERT G. STRONG
Slick Airways Inc.
P. O. Box 6568
San Antonio, Tex.

NEW AVIATION PRODUCTS

Safer Seat Belts

Airlines and aircraft manufacturers shopping around for high strength seat belts, in accordance with Civil Aeronautics Administration Technical Service Order C 22 and NAS 802, should be interested in a new line of safety belts offered by Associated Suppliers Co, division of the B-N Corp.

The manufacturer is offering the B N 3 1500 single passenger safety belt and the B N 2-999 two-passenger safety belt. The latter model was originally designed as a 3000 lb single-passenger belt meeting requirements of NAS 802. With a slight change in webbing, it will exceed 20G requirements, according to Associated

The firm says the new belts meet and exceed TSO C-22 and NAS-802 by these margins

- Over 800 lb more tensile strength in buckle than required by CAA
- Over 500 lb. more tensile strength in webbing than required by CAA, allowing many additional months before deterioration requires replacement
- Cam-action buckle insures reliable operation under all conditions, can be opened under full load by hand. There is a 3-year warranty on buckles
- Adds no weight over present equipment

The single-passenger belt has been tested by the Glenn L. Martin Co. whose engineers say "that this assembly as tested will satisfactorily comply with the physical strength and functional requirements as set forth in NAS-802 and CAA TSO C 22."

The manufacturer is at 3355 Glendale Blvd, Los Angeles 39

Vinyl-Coated Wire

"Considerable saving in cost, weight and installation time" in setting up electrical circuits around fueling areas is promised through use of a new gasoline and oil-resistant wire called "Geotrol."

Developed by General Electric, the plastic-insulated wire reportedly is the first non lead-covered conductor of its type to be listed by the Underwriter's Laboratories, Inc. It is designed for wiring in conduits to gas pump islands at filling stanchions and for lighting circuits in areas where oil products are likely to cause deterioration.

Wires are insulated with vinyl compound and sheathed in a jacket that is highly resistant to petroleum products. Address: Construction Materials Dept., General Electric Co., Bridgeport 2, Conn.

Makes Tools Harder

A fast acting case-hardening compound for toughening both steel and cast iron, has been developed by Doughty Laboratories, New York.

Called "Hard'N'Tuff," the product will provide a nitriding, chromizing and carburizing effect when applied to properly heated metal surfaces, the maker claims, improving structural quality, hardness and wear. With the compound, a soft 1020 carbon steel reportedly can be raised to a hardness of about 60 Rockwell C or 600 Brinnell.

If applied to high-speed drills, cutting edges and wearing surfaces of all types, such as dies, hammers, cams, and other parts, Hard'N'Tuff will substantially increase service life and reduce maintenance costs, Doughty believes. It may permit, in some cases, the replacement of scarce and expensive metals with low-cost materials. Address 299 Madison Ave., New York 17.

Tube Uses Fiberglas

An improved electrical conduit, weighing less than conventional types, more flexible and providing more uniform shielding and better resistance to moisture, flame, oil and fungus, reportedly has been developed by an engineer of the National Electric Products Corp., Pittsburgh.

The conduit is expected to find wide usage in applications involving high frequency currents, such as aircraft radar equipment. Lighter weight and greater flexibility have been achieved, partly through the use of Fiberglas in the conduit, according to Owens-Corning Fiberglas Corp.

It consists of an inner woven tubing of longitudinal Fiberglas yarns, a spiral wrapping of metal foil and an outer, braided jacket of aluminum wire. Conventional construction features a spiral armor of interlocked aluminum strip over a braided, aluminum wire jacket.

Plexiglas Cleaner

Lucite and Plexiglas can be cleaned safely and easily, and masking tape and other stubborn foreign material can be removed quickly with "Rez N Kleen" says the maker, Schwartz Chemical Co., Inc. The product also is suitable for use on ordinary glass.

The company recommends its use for fast and efficient cleaning of transparent acrylic aircraft enclosures, such as windows, side blisters and turret domes. The cleaner reportedly has excellent shelf life. Address 326 W 70 St., New York 23.

ALSO ON THE MARKET

Contamination of used engine oil reportedly can be determined quickly and accurately with Photoelectric Crankcase Oil Tester. Contamination is indicated by gage showing percentage of light transmission through special glass discs holding dirty oil. Made by Photovolt Corp., 95 Madison Ave., New York 16.

New flood sheet for Roto-Wash spray booths permits intake of paint-laden air through water curtain, providing "the greatest amount of intake area available in spray booths today." Made by Newcomb-Detroit Co., 5741 Russell, Detroit 11.

Radio-frequency gear hardening machine carries spur, cluster, and integral spindle gears and shafts through automatic cycle. Uniform hardening is achieved through precise timing of preheat, heat-treat, and quench operations. Made by Westinghouse Electric Corp., 306 Fourth Ave., Pittsburgh 30.

Stainless steel socket set screws and cap screws, non-magnetic and non-heat-treated, are available. Made of 18 8 stainless, they come in ¼ to 3½-in lengths and in diameters from No. 4 wire size to ⅜ in. for set screws and No. 4 wire to ½ in. for cap. Made by Bristol Co., Waterbury 20, Conn.

Electrical insulation can be tested with new device developed by GE. Called Current Limited High potential Tester, it aids equipment manufacturers and service shops in checking insulation flaws in coils, relays, motors and similar parts. Made by General Electric Co., Schenectady 5, N. Y.

New Hydraulic Pump Has High Output

Vickers 3918 completes 1000-hr. service test on Convair 240.

A new hydraulic pump, with the highest output of any pump designed for aircraft use, according to the manufacturer, was recently made available by Vickers, Inc., of Detroit.

The variable displacement, high capacity unit, labeled PV3918, has just completed a successful 1000 hr. service test on a Continental Airlines' Convair 240 where it is used in the cabin supercharger drive system. The 240 is the only U.S. airliner equipped with an all-hydraulic drive shaft to operate a cabin supercharger which is non-engine mounted.

▶**High Capacity Needed**—Need for a high-capacity pump became apparent when Convair engineers found that they would have to install four hydraulic pumps (three were mounted on a special gear box on the left hand engine, the fourth attached to the right engine) to drive the AiResearch supercharger at speeds required to meet the originally established operating specifications. (At the time these specifications were set up, no combination of one or two pumps then available could provide the necessary supercharger output.)

At first the system gave trouble. American Airlines decided to convert its entire fleet of 240s to the engine mounted Stratos cabin compressor (AVIATION WEEK Nov. 21, 1949). Other operators, however, bore with the hydraulic drive set-up.

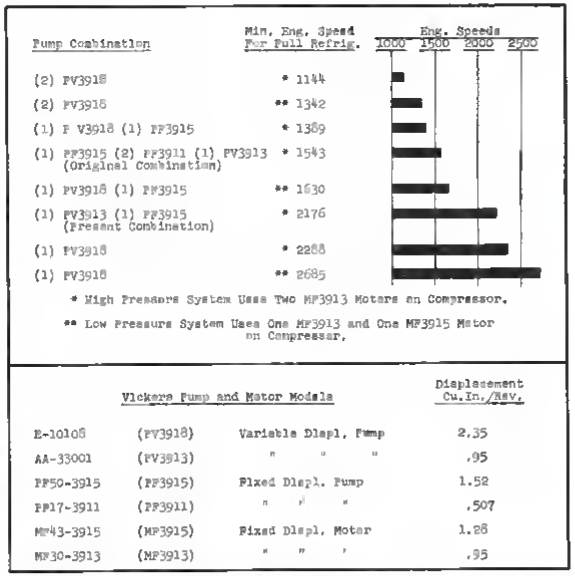
By relaxing their performance requirements, the airlines concerned were able to reduce the four pumps to two. This not only simplified the supercharger drive system but also lightened it and reduced maintenance. However, cabin refrigeration was sacrificed. Full refrigeration, with no pressurization, required 2176 engine rpm. according to Vickers, a division of the Sperry Corp. Although this situation is not desirable, the operators found they could live with it and most of the 240s are so operated today.

▶**New Pump**—Vickers, in the meantime, was busy developing and building the PV3918 model variable displacement pump. This single package, with a maximum capacity of 2.35 cu. in./rev., offers more oil to the Convair 240 cabin supercharger drive circuit than the two fixed and one variable displacement pump originally mounted on the left engine.

Another comparison. The standard main system pump used on DC-4s, DC-6s, 240s and 202s deliver 3.2 gpm. at 1500 pump rpm. The PV3918 puts out 15.2 gpm. at the same rpm. Out put at takeoff engine rpm. is 40 gpm.

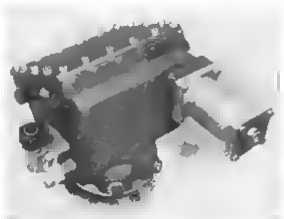
▶**New Possibilities**—Vickers claims these advantages for the new pump:

- It provides a greater speed range at the compressor for constant engine speeds.
- It can be "feathered" or positioned at zero output in case a malfunction makes it desirable to stop the com-

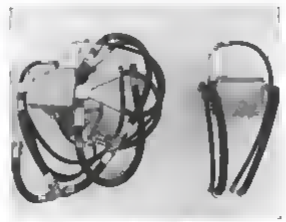


	Vickers Pump and Motor Models		Displacement Cu.In./Rev.
E-10108	(PV3918)	Variable Displ. Pump	2.35
AA-33001	(PV3913)	" " "	.95
PF50-3915	(PF3915)	Fixed Displ. Pump	1.52
PF17-3911	(PF3911)	" " "	.507
MF43-3915	(MF3915)	Fixed Displ. Motor	1.28
MF30-3913	(MF3913)	" " "	.95

CALCULATION of the various Convair 240 supercharger drive pump and motor combinations is easily made with the help of this chart. Source is Vickers, Inc.



PV39I8 variable displacement hydraulic pump. Output is 15.2 gpm. at 1500 rpm.



SINGLE PUMP (right) delivers more fluid than three pump combination (left).

pressor This feature eliminates the need for a mechanical disconnect since the feathering action can be controlled from the cockpit

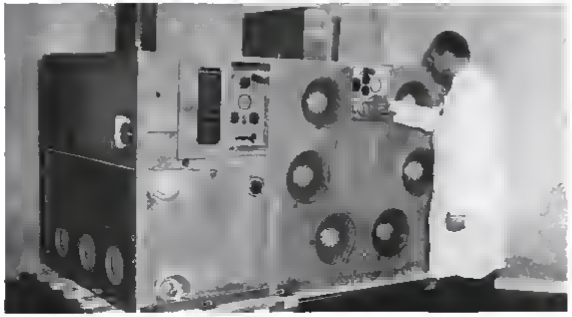
• **One unit, used alone** on the right engine (during winter operation when refrigeration is not required) will permit a maximum weight saving of approximately 135 lb per airplane.

Other possible pump combinations (see accompanying chart) for the 240, according to information from the manufacturer

• **Full refrigeration** is available at 1389 engine rpm if a fixed displacement PF50-3915 pump is used with one PV3918. This contrasts with full refrigeration at 1543 rpm with the original four pump configuration or 2176 rpm. for the current two pump standard

• **If two of the new pumps** are used on the 240, full refrigeration is available at 1144 rpm. Not only does this performance make ground cooling practical for the Convair (provided the intercooler is supplied with cooling air), but it also makes pressurization possible with one engine out.

Pan American World Airways and KLM Royal Dutch Airlines are both service testing the PV3918 pump, according to Vickers, who told AVIATION WEEK that operations to date have been entirely trouble free



Gas Turbine Powers Ground Heater

A portable ground heater capable of producing a blast greater than 100 large floor furnaces has just been delivered to the USAF by AiResearch Mfg. Co.

The Los Angeles firm claims that the heater is the first of its kind to be powered by a gas turbine engine. The turbine, of light and compact design was recently developed by AiResearch

▶ **Warms B-36s**—The new heater resulted from a USAF rush development production order. The manufacturer says that the 4,000,000 Btu/hr. capacity (on a —65 deg. day) is designed to warm up a six engine B-36 within 15 min. in sub zero Arctic cold

Among the many uses seen by the manufacturer for its "hot box" are heat aircraft engines and cabins, de-ice wings, control surfaces and landing gear; free hydraulic lines; pre-heat many types of mechanical ground equipment and even heat living quarters.

McDonnell Backlog Climbs Steeply

Large Navy orders for F2H Banshee twin-jet fighter boost military orders to record $200-million-plus.

McDonnell Aircraft Corp.'s aviation backlog is threatening to climb right off the charts. Although skyrocketing aviation orders are becoming fairly commonplace, McDonnell's balance sheet still is a standout. Since June 30 military orders have been upped from a healthy $62,695,281 to over $200 million—biggest backlog in McDonnell's eleven-year history, topping even May 1948's record $94,152,679 and World War II's peak $53,588,440. This is revealed in the company's recently issued annual report.

Most of the increased business has been for the twin-jet carrier-based F2H Banshee, with the Navy ordering somewhat less than 1000 in addition to previous commitments. Deliveries of the tip-tanked longer-ranged F2H-2 were started in fiscal 1950 and are continuing through fiscal 1951. Some of these are F2H-2N night fighters having slightly extended noses with detection equipment.

▶**Voodoo Prospects**—Although the company is assigned as a Navy plant, McDonnell also has bids out for USAF business with its 700-mph. class XF-88 Voodoo penetration fighter. The Voodoo is being eyed by the Army as a ground support vehicle too.

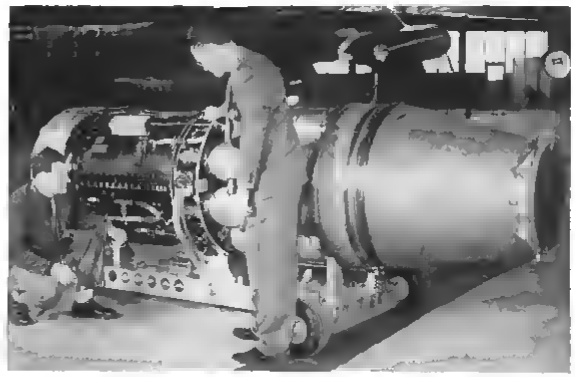
The two prototype Voodoos completed their AF evaluations in July and the experimental contract was concluded in August. Excellent performance characteristics have put this plane in a very favorable position for procurement. Performance is improved by use of MAC-developed short after burners incorporating automatic control for metering, igniting the fuel and continuously trimming the variable exhaust nozzle, and an automatic yaw dampening device.

The company's experimental work includes further development of its two helicopter testbeds. The five-ton XHJD-1 Whirlaway completed a Navy contract in January last year, but MAC is financing further research. A six-year development contract received from the USAF in fiscal 1950 for the Little Henry ramjet-powered copter is continuing with concentration on improving autorotation qualities. Little Henry has been designated the XH-20.

An 8-in. valveless pulsejet project has been completed for the Navy and new work includes improvement of ducted pulsejets and ejector ramjets.

▶**Facilities Increased**—A new $2.5-million structure for testing, servicing and storing jet planes is the major item in a new plant expansion program. The building will measure 500 x 200 ft. and will occupy part of a new 11.3-acre plot McDonnell is leasing from the City of St. Louis. (Gross floor area in June totaled 1,591,311 sq. ft.) An anti-noise and heat-suppression program is also underway at a cost of about $80,000.

McDonnell wound up fiscal 1950 with sales of $38,688,383 and earnings of $2,815,219 after taxes. Capital stock and earned net surplus increased from $5,260,999 to $7,623,881. Employment at the close of the 1950 fiscal year was 5560.



EASY-TO-HANDLE DOLLY

Boeing finds handling of B-47 powerplants has been simplified by use of this neat wheeled dolly which is fitted with a towbar for easy ground handling. The wheels can be retracted to permit fastening the carriage to the floor of a plane or truck for transporting. Boeing mechanics have taken a J-47 power pack from its Stratojet nacelle, bolted it to the dolly, unbolted it and returned it to the plane in 1 hr. 40 min.

AF Invitations

Bids openings are 20-30 days after approximate issue dates shown in the following bid proposals. Bid sets containing specifications for items to be procured will be sent to qualified applicants who state bid invitation number.

One bid set will be available for examination without obligation by prospective bidders, after bid publication date, at each of the seven AMC procurement field offices. This will enable firms to see specifications before writing or telegraphing for their own bid sets.

Procurement field office locations: Boston Army Base, Boston 10, Mass.; Government Aircraft Plant No. 4, Ft. Worth 1, Tex.; 39 S. LaSalle St., Chicago 3, Wright-Patterson AFB, Dayton, Ohio; West Warren and Longo Aves., Detroit 32; 155 W. Washington Blvd., Los Angeles; 67 Broad St., N. Y. 4.

INVITATIONS

Fibre, rod and sheet, 1-2 items, bid invitation No. 51-424 opening date 12 Oct., delivery within 60 days after date of award.

Phenolic rod and sheet, 1-6 items, bid invitation No. 51-423 opening date 9 Oct., delivery within 60 days after date of award.

Ground servicing, Class 19-C, 1-44 items, bid invitation No. 51-358, opening date 6 Oct., delivery complete within 180 days from date of award.

Resistor, 1-5 items, bid invitation No. 51-367, opening date 4 Oct. delivery within 60 days after date of award.

Shaft, 681 each bid invitation No. 51-286, opening date 3 Oct. delivery complete by May 1952.

Ground servicing, Class 19E, 1-4 items, bid invitation No. 51-411, opening date 3 Oct., delivery within 30 days after date of award.

Steel wire, 6660 lb., bid invitation No. 51-426 opening date 11 Oct., delivery within 120 days after date of award.

Anodes, 2344 lb., bid invitation No. 51-425 opening date 10 Oct., delivery within 60 days after date of award.

Bar and beam assembly, 264 each, bid invitation No. 51-435, issue date 16 Sept. delivery within 60 days after date of award.

Connectors, 1-6 items bid invitation No. 51-436, issue date 16 Sept., delivery complete within 60 days after date of award.

Case, carrying, typewriter, 2404 each, bid invitation No. 51-446, issue date 15 Sept., delivery complete within 60 days after date of award.

Kits to modify pilot seats, 460 each, bid invitation No. 51-434, issue date 15 Sept.,

delivery complete within 60 days after date of award.

Brace assembly, 1-26 items, bid invitation No. 51-419 issue date 15 Sept., delivery within 90 days after date of award.

Connectors, 1-6 items, bid invitation 51-431, issue date 15 Sept., delivery complete within 60 days after date of award.

Cap assembly, 3606 each, bid invitation No. 51-438, issue date 15 Sept., delivery complete within 60 days after date of award.

Cabinet, filing, steel, 1-4 items, bid invitation No. 51-433, issue date 15 Sept., delivery complete within 30 days after date of award.

Lamp assembly, 1-14 items bid invitation No. 51-436 issue date 15 Sept., delivery complete within 60 days after date of award.

Trailer assembly, 166 each, bid invitation No. 51-456 issue date 18 Sept., delivery complete within 180 days after date of award.

Tower, aerial, 60 each bid invitation No. 51-457 issue date 18 Sept., delivery within 60 days after date of award.

Bolts, 1-51 items, bid invitation No. 51-462 issue date 18 Sept., delivery within 90 days after date of award.

Filters, 1-2 items, bid invitation No. 51-466 issue date 18 Sept., delivery complete within 150 days after date of award.

Fuzeels, 1-6 items, bid invitation No. 51-481 issue date 18 Sept., delivery within 60 days after date of award.

Ammeter and analyzer, 11 each bid invitation No. 51-467 issue date 18 Sept., delivery within 60 days after date of award.

Meter generator, 40 each, bid invitation No. 51-480 issue date 18 Sept., delivery complete within 210 days.

Bench, work, 3600 each, bid invitation No. 51-494, issue date 18 Sept., delivery complete within 120 days after date of award.

Bolts, 1-91 items, bid invitation No. 51-469, issue date 25 Sept., delivery complete within 90 days after date of award.

Aircraft hardware Class 04, 1-16 items, bid invitation No. 51-570, issue date 25 Sept. delivery complete within 60 days after date of award.

Screws, 1-66 items bid invitation No. 51-554, issue date 25 Sept., delivery complete within 120 days after date of award.

Trailer, 56 each, bid invitation No. 51-551, issue date 25 Sept. delivery complete within 120 days after date of award.

Pigment alum paste, 57,566 lb. bid invitation No. 51-540 issue date 25 Sept. delivery to start within 30 days, complete within 60 days.

Aircraft and engine accessories, 1-42 items bid invitation No. 51-552 issue date 25 Sept., delivery complete within 120 days after date of award.

Cloth, abrasive, 1-16 items, bid invitation No. 51-559 issue date 25 Sept. delivery 50% within 60 days complete within 120 days.

Coupling RF ballet, 146 each bid invitation No. 51-560 issue date 25 Sept.—delivery within 150 days after date of award.

Truck crash, 345 each bid invitation No. 51-563 issue date 25 Sept. delivery to start in 120 days complete within 365 days.

Aircraft hardware, 1-51 items, bid invitation No. 51-566 issue date 25 Sept. delivery complete within 60 days after date of award.

Combiner assy., 1-14 items bid invitation No. 51-555 issue date 25 Sept. delivery 25% within 45 days complete within 120 days.

Panel, Airport lighting control, 1-6 items bid invitation No. 51-57 issue date 25 Sept. delivery complete within 150 days after date of award.

Iron or steel sheet, 1-4 items bid invitation No. 51-550 issue date 25 Sept. delivery within 120 days after date of award.

Rectifier, 1-5 items bid invitation No. 51-552 issue date 25 Sept., delivery within 90 days after date of award.

Receiver, 30 each, bid invitation No. 51-566 issue date 25 Sept. delivery within 60 days after date of award.

Steel chrome nickel, 1-35 items bid invitation No. 51-577, issue date 26 Sept. delivery within 30 days after date of award.

Camera, 1 item bid invitation No. 51-576, issue date 26 Sept. delivery preproduction samples for approval 60 days after date of award—production quantities for inspection 160 days after date of award.

Shovel, 50 each, bid invitation No. 51-566 issue date 26 Sept. delivery within 60 days after date of award.

Timer, photographic, 1 item bid invitation No. 51-561 issue date 26 Sept. delivery 50 per month after approval of first article.

Case, tester instrument, 6 each, bid invitation No. 51-579 issue date 25 Sept. delivery within 60 days after date of award.

Tester assy., 53 each bid invitation No. 51-565, issue date 25 Sept. delivery complete within 90 days after date of award.

Switch, toggle, 1-16 items, bid invitation No. 51-560, issue date 26 Sept., delivery complete within 180 days after date of award.

Cooler, sanitary air, 43 each, bid invitation No. 51-564 issue date 26 Sept., delivery complete within 30 days after date of receipt of approval of first article.

Pump assembly, 67 each, bid invitation No. 51-592, issue date 26 Sept. delivery within 60 days after date of award.

Chain, 1-13 items bid invitation No. 51-578 issue date 26 Sept., delivery complete within 120 days after date of award.

Intervalometer, 65 each bid invitation No. 51-580, issue date 26 Sept., delivery within 90 days after approval of first article.

Steel, chrome nickel, 1-61 items bid invitation No. 51-594, issue date 27 Sept. delivery within 120 days after date of award.

Aluminum sheet, 1-22 items bid invitation No. 51-593 issue date 28 Sept. delivery within 60 days after date of award.

Nickel, 1-6 items bid invitation No. 51-532 issue date 28 Sept. delivery within 90 days after date of award.

Dolly assembly, 701 each bid invitation No. 51-581 issue date 28 Sept. delivery within 180 days after date of award.

Ammeter, 1-6 items, bid invitation No. 51-569 issue date 28 Sept. delivery complete by March 1951.

Saw, circular, 25 each bid invitation No. 51-605, issue date 28 Sept. delivery complete within 75 days after date of award.

Connector-plug, 1-12 items, bid invitation No. 51-606 issue date 29 Sept., delivery within 30 days after date of award.

Washer, photographic, 70 each bid invitation No. 51-612, issue date 29 Sept., delivery complete within 90 days after approval of first article.

Antenna assembly, 2167 each bid invitation No. 51-620 issue date 29 Sept. delivery to start within 180 days and complete within 540 days.

Oven, electric, 3 each bid invitation No. 51-623 issue date 29 Sept. delivery to start within 30 days and complete in 60 days.

Adapter connector, 63-162 each, bid invitation No. 51-625, issue date 26 Sept. delivery complete within 60 days.

AF amplifier, 1-2 items bid invitation No. 51-626 issue date 26 Sept., delivery complete within 60 days after date of award.

Light assembly, 1-26 items, bid invitation No. 51-629, issue date 2 Oct., delivery to begin Nov. 1950 and complete in Mar. 1951.

Bolt, aircraft, 1-100 items bid invitation No. 51-630 issue date 6 Oct. delivery to start within 30 days, complete within 60 days.

Clip loop type, 1-23 items bid invitation No. 51-631 issue date 2 Oct. delivery complete within 60 days after date of award.

Cable, 1-3 items, bid invitation No. 51-632 issue date 2 Oct., delivery within 180 days after date of award.

Connector-plug, 1-11 items, bid invitation No. 51-628, issue date 3 Oct., delivery within 15 days after date of award.

CESSNA OUTPUT ROLLS

A late view at Cessna Aircraft Co.'s personal plane production line in the company's Wichita plant shows some two-placers get final touches. The various models of Cessna's personal planes are coming off the lines at the rate of 110 monthly.

PRODUCTION BRIEFING

▶ **Aro Equipment Corp.**, Bryan, Ohio, has bought Taylor Machine Co., Cleveland, and plans to produce aircraft accessories formerly made at the main plant at the new facility. James P. Johnson, former ARO executive is vice president in charge of the former Taylor plant. Production will include bomb hoists, oxygen regulators, and hydraulic aircraft pumps. Aro plans to extend output facilities even further.

▶ **Link Aviation, Inc.**, Binghamton, N. Y., has upped all hourly salaries 10 cents an hour to compensate for cost of living increases.

▶ **Chance Vought Aircraft division** of United Aircraft, Dallas, has received commitments for tooling and production of major components of the Boeing B-47 and Lockheed P2V. Vought plans to increase personnel by 700 to handle the contracts. The company is also handling production of the F4U-5N, an advanced version of the F7U and spares for the F4U-4.

SALES & SERVICE

RYAN NAVION SUPER 260 for '51 is identical at first glance to previous model except for switch to Hartzell all metal propeller and.

EXTERIOR DOOR for loading luggage

PLUSHIER INTERIOR reflects greater attention paid to providing passenger comfort.

Ryan Spruces Up Super Navion for '51

Ryan Aeronautical Corp.'s 1951 Super Navion 260s are rolling off the assembly line in San Diego, with deliveries to begin early in November. Price has been upped to $14,485 from last year's $13,985.

Except for a number of refinements suggested by owners, distributors and dealers, the new plane is basically similar to the previous model. Notable changes include an exterior baggage door as standard equipment on the left-hand side, new Hartzell all metal prop fitted at $200 additional, improved cabin cooling and more luxurious cabin.

A push-button engine starter is fitted.

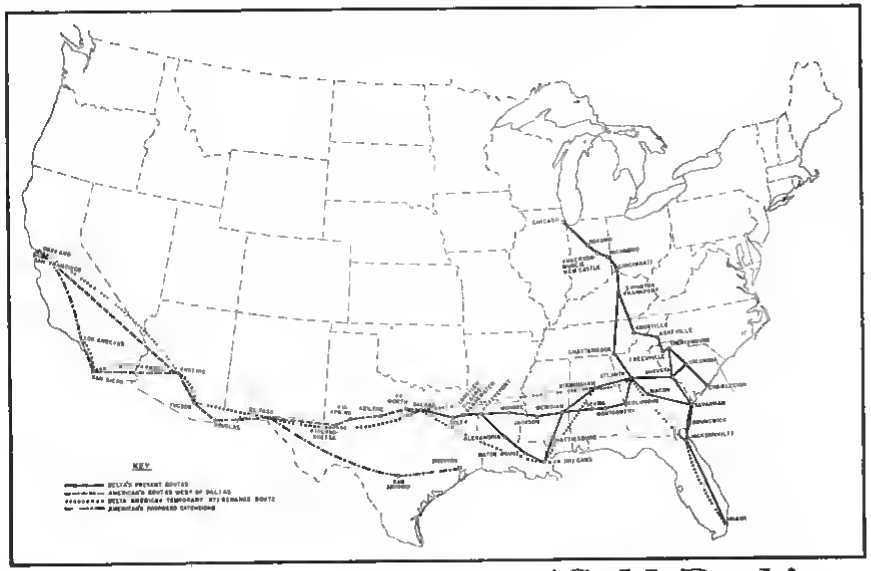
▶ **Cabin Styling**—Red, green and gray leather trim are used on interior fabrics. Side panels are of pleated broadcloth and seats are of pleated bark weave.

Seats and backrests contain thicker foam rubber than previously. Map pockets are located in the seat backs. Sun visors for windshield and rear windows and curtains for the larger windows are available.

Instrument panel has been modified to permit easier reading. To allow more positive identification of carburetor heat and mixture controls, the former is a square knob and the shape of the latter is round.

▶ **Extra Tank**—A 20-gal. auxiliary fuel tank is available at no extra cost, increasing the normal 415-mi. range to 640 mi. at 170 mph., and up to 900 mi. at lower power setting. With normal tankage, total passenger and baggage weight up to 690 lb. can be carried.

The Hartzell prop turns at 1765 rpm. at maximum cruise, allowing quieter operation. Takeoff can be made in 400 ft., with flaps down, landing roll takes 470 ft. at full 2850 lb. gross weight.



Airlines Stage California 'Gold Rush'

Civil Aeronautics Board faces a difficult decision in judging claims of six carriers who eye western routes.

The two biggest questions buzzing in Civil Aeronautics Board circles are What should the Board do about the southern service-to-the-west route case? And what does new Chairman Delos Rentzel think it should do?

Final decision may change the southern transport picture markedly

Most observers think there will be positive action soon—probably within three months Rentzel is the key fifth Board member, and even the other Board members have no firm idea of what he will think Few outside the Board itself know the drift of thought of the other four Board members

Rentzel put off the hour for oral argument last Tuesday, Oct 10, from 10 am to 2 pm so he could get his whole staff together for the first time Right after that first full staff meeting under the new boss, the five Board members took seats in the hearing room

They heard attorneys of six airlines battle one of the greatest route cases of transport history

▶**Examiner's Recommendations**—CAB Examiner J Earl Cox mulled it all over last spring and came up June 21 with the following recommendations (AVIATION WEEK July 3, p 33)

• **Give Eastern what it asks,** with some limitation on service to particular cities

• **Give American** its present temporary Delta interchange system

▶**Six of Them**—Contenders for the southern transcontinental route are.

• **American,** which wants relatively little route extension, plus permanent certification of the present Delta American interchange

American's Oct 2 brief to the Board on its proposal for southern service to the west leaves out the earlier-proposed extension from Houston to New Orleans and Dallas to Houston because the proposed Braniff American interchange would take care of that service CAB observers think the Board will put off the Braniff American interchange for consideration with Continental-TWA interchange proposal

• **Braniff,** which asks a small eastern extension—Houston-New Orleans—plus three westward extensions converging at Phoenix, Ariz, and going on to the West Coast

• **Continental,** which asks criss-cross extension patterns southeast to Houston and New Orleans and west to the Coast

• **Delta,** which asks twin extensions to Los Angeles from Ft Worth and San Antonio, plus Dallas-Houston New Orleans link-up with San Antonio, plus stub-end extension Ft Worth-Albuquerque

• **Eastern,** which asks Miami-Tampa-New Orleans short-cut route, plus extension from San Antonio to the Coast

• **National,** which asks a twin extension from New Orleans to El Paso, converging there in route to the Coast

All except Delta ask through service to San Diego, Los Angeles, San Francisco Oakland

▶**Cox's Reasoning**—Here are some of the most important questions facing the Board, and how Examiner Cox answered them

• **Do Gulf State cities need** through service to the west, and vice versa? Examiner Cox says the Board already settled that question when it allowed the Delta-American interchange That service connects at Dallas

• **Is the Delta-American** interchange enough? Cox says no. He recommends the interchange remain as is, while Eastern should get an extension to the West Coast from San Antonio This, he says, would give the twin advantages of competition and faster service to the Gulf State cities, especially Miami

• **Can it pay?** Cox says growth of the area will afford it, and the actual presence of the service will create demand for its use

He also points out that the potential of this area is three times that of the northern transcontinental route the Board gave Northwest

• **Will competition be destructive?** The routes are only semi-competitive on most segments, Cox says. Eastern's route would mainly create new traffic, especially along the Miami-gulf cities-Houston route. Eastern will not be competing for transcontinental traffic from the northeastern U S because such a route requires many stops, is 194 miles longer, and can be hampered further by CAB restrictions

▶**Other Lines**—Braniff, Continental, Delta, and National are also vitally interested in the southern service to the west

The examiner rejects their proposals, mainly on grounds of inadequate service to the southeast as well as the financial burden of great expansion for the smaller lines

The Board may work out almost any combination or none

COLORED MAP dominates forward bulkhead of PAA's new-style, eye-catching interior

High Style Comes to PAA's Fleet

'Clipper Hotspur' Connie illustrates richer-looking, longer-lasting, costlier interior furnishings.

By Scott Reiniger

Pan American World Airways plans to equip its planes with more expensive and attractive furnishings with the aim of saving thousands of dollars annually on material replacement and maintenance costs—and at the same time pleasing its passengers more

Reasons for this optimism are bundled up neatly in the "Clipper Hotspur," luxuriously outfitted L-049 Constellation recently put through major interior modifications at PanAm's Miami overhaul base

▶**Skin Deep**—But Hotspur's richness is not of the delicate type Under the passenger-pleasing surface is greater ruggedness, which should result in longer wear and lesser maintenance for the airline

The Hotspur interior represents a complete transition from wool to plastics and cotton prints By using patterned Nylons, and cotton-print rugs and walls protected by tough coats of clear vinyl, the airline's engineers believe they have found the key to combining beauty with practicality

PAA, after winnowing a few mate-

STAR-STUDDED seat covers are made of Nylon. Curtains and drapes carry map pattern

nals from the many which were rigidly tested at its Miami laboratory, carefully selected matching colors and patterns. The carrier says it has developed an interior that

- **Permits standardization** of all furnishings in all craft operated by PAA's Atlantic and Latin American divisions, including Stratocruisers, Constellations, Convair-Liners and DC-4s.
- **Lasts two or three times longer,** particularly cutting down on replacement of rugs, seat covers and curtains.
- **Cleans more easily** and won't have to be cleaned as often, stays fresher looking, and doesn't show as much dirt, scratches and scuffing.
- **Uses materials that don't fade,** stain easily, or shrink.

▶**New Lease**—The new materials will extend the life of PanAm's older planes. The carrier plans soon to modify completely all Atlantic division Connies and probably Latin American division DC-4s.

The furnishings in many of these planes are worn and ready for replacement now, the firm reports.

An extra seat, making 51 in all, and Stratocruiser-type tables which hook to the seats will be included in the Connie modification.

The extra seat can be used when a fully loaded plane picks up a short haul passenger at an intermediate point. It has no window, being located under the coat-rack and enclosed by a drapery that can be pushed aside.

Modification of the Stratocruisers and Convair-Liners will be gradual, since these planes are relatively new. As items wear out, they will be replaced by the new materials. The new furnishings won't clash when installed in craft going through the gradual change. One of the engineers connected with the project explains: "We designed the new Connie interior with the Stratocruiser in mind. Colors were selected so that new materials replacing worn-out furnishings would fit in with original materials still left in the plane and not yet ready for replacement."

PanAm estimates the cost of modifying each Connie to the new style, including the extra seat and polishing up the crew compartment, will come to $10,600.

Replacing present worn-out materials, which will have to be done in any event, with new furnishings of the old type would cost $5425.

▶**Sizeable Savings**—The airline figures the annual cost of replacing furnishings, if old type materials were used, would come to $3460. With the new plastic furnishings, the replacement cost is estimated at only $865 per year—a per plane saving of $2595. On this basis, new furnishings will pay for themselves in two years.

Since 14 Connies are now involved, the total saving (after two years) on these alone adds up to $36,330 annually.

And the airline anticipates similar savings when the modification penetrates to the Stratocruisers, Convair-Liners and DC-4s.

PanAm believes still further savings will be realized in reduced day-to-day maintenance costs.

The carrier also feels that the planes can be kept in better shape with fewer manhours.

▶**Standardization**—A saving that cannot be estimated accurately as yet, but one that could be the biggest, is standardization of materials throughout the PanAm system.

For example, approximately seven different materials now are used to cover seats in all types of planes in the system. Standard engineers believe these can be replaced by a single Nylon material.

At least five or six different types of wool rugs and various solid-color "Avtrim" rugs probably will be replaced eventually by a single newly developed Avtrim rug. This boiling-down process can be repeated with numerous other items.

The airline hopes to stock fewer items which can be ordered at lower unit cost in large quantities.

Here are the materials PanAm plans to use in the refurbished Connies:

- **"Avtrim" rug** for all compartments except cockpit. It has a "Clipper Cloud" pattern with clear vinyl protecting printed cotton resting on a layer of sponge rubber. The vinyl surface is "roughed" with a broadloom impression. Supplied by Hood division of B. F. Goodrich Co.
- **Avtrim** for ladies room walls. This is a smooth surface, clear vinyl protecting canvas which carries a tropical flower pattern. Same canvas is used for the skirt on the new dressing table. Men's room uses this material but with a different pattern.
- **Kalistron** is used for covering front bulkhead in cabin. It is a tough, clear vinyl with a large world map in coral and green colors sprayed on back. Supplied by U. S. Plywood Corp.
- **Coral-colored leather** is used for armrests and sides of seats and entirely covers the stewardess' seat. Supplied by Lackawanna Leather Co.
- **Nylon "Pressceloth"** carrying a coral-green map pattern is used for curtains and drapenes. Grey headrest covers also are made of this material. Supplied by Schumacher & Co.
- **Ribbed Nylon upholstery** carrying a stir pattern is used for grey seat covers. Also supplied by Schumacher & Co.

The Hotspur makes "plain janes" out of other PAA Connies with their "beige and cream" interiors. New rectangular lamps give softer lighting than the older protruding circular lamps formerly used.

The crew compartment has been dressed up on a par with the main cabin to carry short haul passengers in a pinch—hidden from the navigator by a patterned curtain. The pilot can talk to passengers through a new public address system.

The Hotspur modification was carried out by PanAm's Latin American division under the guidance of PAA's System Standards Committee and Pamela Drake, interior decorating expert for the airline.

LAA Lessons

Copter airline bids for bigger craft on basis of operational experience.

With three years' maintenance and operational experience on four-place Sikorsky S 51 helicopters under its belt, Los Angeles Airways has put in a bid to buy the larger Sikorsky S-55, which would permit start of passenger service if the Civil Aeronautics Board approved

The S 55, commercial designation of the Air Force H-19, seats 8-10. Both Air Force and Navy have ordered this craft in quantity, and even if LAA came to terms with Sikorsky on price, it would be up to the services whether the airline would be permitted to buy

▶**One For the Show**—There's a good chance the military would let at least one S 55 be diverted to Los Angeles Airways Flying a maximum number of hours a day and hewing to a tight budget, Clarence Belmn's LAA has produced a great deal of honest knowledge about helicopter maintenance that has been of value to the services.

Every aspect of maintenance has been improved at LAA because economy necessitated it

You can start with the airframe. Sikorsky figured the airframe life of the S-51As and Bs at 2000 hr One of Belmn's ships already was 3611 hr, and the company has extended the airframe life to 3000 hr with permission of the CAA

Tail gear box overhaul period has been hiked from 400 to 600 hr, the general gear box from 100 to 480 hr.

Engines are changed now at 1000 hr as against a low figure of 600 when LAA started its helicopter mail service

▶**Inspection Schedule**—Stanley E Brown, general maintenance supervisor for LAA, has set up this schedule of inspection periods for the helicopters:

Trip, daily, 40 hr., 80 hr., 120 hr., 240 hr., and 480 hr Then comes the major aircraft overhauls between 2000 hr and 3000 hr The major overhaul is broken down into sections, so that no ship is tied up for very long For example, the flight controls might be done at 2100 hr, the tunnel at 2500, the landing gear at 2800

Brown's maintenance crew made the biggest increase in overhaul times in the first two years of operation Philosophy has been to increase maintenance on allied components simultaneously in order to synchronize overhauls on different parts For example, when they get the rotor head up to 300 hr., they'll want the main gear box up to 600 hr That's to eliminate bringing the aircraft into the shop many times for short periods.

▶**Man Hours Down**—In addition to extending overhaul periods, maintenance experience has also reduced the man hours required on different jobs Main rotor head overhaul now is accomplished in 72 man hours, compared to the original 200 Some other maintenance times (all figures covering removal, overhaul and installation): Tail rotor, 20 hr.; tracking of blades, 120-128 hr.; general gear box, 10 hr., main gear box, 135 hr., landing gear, 9 hr.; flight controls, 75 hr

To save time and cost and eliminate rotor head trouble, LAA's maintenance gang has added lubrication fittings, designed several special tools for packing.

LAA schedules flying hours of the different ships to meet overhaul periods Way it works: four ships are operational every day, three flying, one in reserve Another is in the shop Flying schedule of a particular ship is speeded up or slowed down to keep maintenance work levels as nearly constant as possible

Instrument flying has boosted flying hours, and of course added to maintenance work

An example of the ingenuity you need when you haven't money to throw around is LAA's solution of the lighting problem on night operations Setting up elaborate lighting systems and bringing in power lines to LAA's twenty some odd heliports would have been prohibitive. Belmn solved the problem by installing Scotch Light markers, which are easily picked up by the helicopter landing lights

Gasoline consumption on helicopters is high because of the numerous take-offs and landings on the mail run Consumption runs to 31-32 gal./hr.

Direct maintenance varies from 8 to 20 cents a mile It costs the company about $1.20 a mile to operate the copters.

▶**Special Problems**—It would take a large book to list all the peculiar problems you run into servicing a group of helicopters One of the big problems are the flapping link bearings in the rotor head Some go as long as 1400 hr some last only 480 hr The average is in the 800-900 range But before Brown went to work on them, the average was close to 200 hr

Brown discovered that a good daily greasing would improve the bearing life three to four times Every day his crew gives the bearings a partial purging The grease gun is applied until old grease can be seen coming out Every 40 hr the rotor head is completely purged of all old grease

Careful assembly of bearings also helps They're installed with a torque meter range of 5 in lb to 100 in lb Assembly includes three steps:

- **Select fit** of the bearings to liners
- **Use of indicators** for straight alignment of needles

■ **Rigid** acceptance of link operation. The link will have to fall down to blade rest from 45 degrees to 60, without any traveling of the link on its longitudinal axis. If it travels, the needles are restraightened and reinstalled.

Brown was having trouble with relief valve seats pounding out and leaking under low pressures. He corrected the trouble by having the valves reworked at each rotor head overhaul.

Clutches have been modified by a special shim plate, also by grinding down the separators to allow clearance of the ring retaining bolts. This permits 100% engagement of the shoes.

▶ **Maintenance Tricks**—There are a lot of little tricks to maintenance. For example, installing the inner races on the hub. The races are set in hot oil, then slid on the spider arm of the hub. That reduces pick up and galling of the spider arm and aids longer bearing life. Another, drilling holes in magneto breaker point housing to prevent oil from accumulating. Sealing of the magneto shielding cover has eliminated excessive pitting of points due to oil and oil vapors.

Brown discovered a permanent inspection was needed to show up pitting and flaws in rotor heads.

Sikorsky and parts suppliers have worked very closely with LAA to smooth out problems of helicopter maintenance. LAA hopes to increase the overhaul period of the main gear box with installation of better parts developed by Sikorsky.

SHORTLINES

▶ **Air Express**—August shipments in U. S. gained 41 percent in revenue over last year—the tenth consecutive monthly gain.

▶ **American Airlines**—Is distributing a pocket timetable of commuter and other important routes. Carrier claims it is first one to show date of expiration.

▶ **Capital Airlines**—Won first prize award from the Direct Mail Advertising Assn. for "outstanding" campaign in the travel and transportation division.

▶ **Flugfelag Islands**—Is now a member of International Air Transport Assn. Company operates from Iceland to England and Scandinavia.

▶ **KLM Royal Dutch Airlines**—Appointed Felix von Balluseck executive vice-president. He was assistant vice-president in charge of the traffic directorate. . . . Company has a new air sea agreement with Grace Lines allowing roundtrip fares for half-and-half circuits.

▶ **Los Angeles Airways**—Hauled 7,447,780 pound miles in August, compared with 7,243,302 a year ago. Operating expenses per revenue mile were $1.10—2 cents over last year.

▶ **Mid-Continent Airlines**—Made a net profit of $32,215 in August, compared with $35,417 a year ago. Operating revenues of $732,732 were up $64,586.

▶ **Pan American**—Says space on its Stratocruisers on the New York-Buenos Aires run has been "virtually sold out on every flight" since service started last July. Service on this run was upped 50 percent this week. . . . CAB says company can suspend Shanghai, China, service until Red coolies cool off. . . . PanAm tried again for a cut-rate $75 tariff ("space-available") from Fairbanks to Seattle, but CAB dismissed the case. . . . Carrier offers $316 Hawaiian tour from the West Coast for one week including hotel and sightseeing trips.

▶ **Panagra**—Reports Argentina and Peru will soon beat down their tourist travel barriers, following Ecuador, Bolivia, Uruguay, Venezuela, and Chile.

▶ **Piedmont Airlines**—Has a CAB show-cause order setting mail pay rate at 58½ cents a plane mile up to 8000 miles per month, less a formula-fixed amount if passenger load factor exceeds 25 percent. This is from July 1 to Dec. 31 this year. Lump sum payment for Feb. 20, 1948, to Dec. 31, 1949, is $2,252,161 (48.42 cents a mile), and for Jan. 19-June 30 this year $780,622 (45.84 cents a mile).

▶ **Sabena**—Will keep its two DC-4s on the Pacific airlift. Service is contributed by Belgium to the UN war effort. . . . Company reports a 39-percent gain in travel to Europe the first nine months of this year. . . . Sabena is opening new offices in Jerusalem and Naples.

▶ **Transocean**—Has its second Navy contract for Aleutian Islands operations.

▶ **United Air Lines**—Won the "Oscar of Industry" trophy awarded by Financial World magazine for the best annual report of any domestic airline in 1949—for United's fourth consecutive year. . . . Company and Air France together have cut cargo rates between seven U. S. cities and 18 points in Europe and the Middle East. Typical example is the Los Angeles-Paris 100 lb. rate of $98, cut from $106.50. . . . United is ferrying Vice President Barkley on a 33-day, 18,000-mi. campaign swing through 45 cities in 18 states. . . . Company President W. A. Patterson says United business is 11-13 percent ahead of last year.

Trans-Australia Gets Out of the Red

(McGraw-Hill World News)

Melbourne—Trans Australia Airlines, the state-owned Australian air transport service, will show the first profit since its establishment in 1946 when accounts for 1949-50 are completed. Because of deficits totaling £903,000 up to June 30, 1949—then equivalent to about $3 million—TAA has been under heavy political fire. The airline's losses figured prominently in the election fight of late last year. One of the pledges on which the present conservative government was elected promised an early end to TAA deficits—or else.

Soon after the new government took office it was rumored that TAA was to be absorbed by Australian National Airways, the major private airline. There was little doubt from the start that TAA would break even after writing off its establishment account. The airline is the most efficiently operated Australian government enterprise. This is not surprising, because from the day of its inception it has been in hot competition with older private airlines. TAA has chalked up an enviable safety record and has drawn much traffic away from the less fortunate ANA.

Panair do Brasil Ends Twentieth Year

(McGraw-Hill World News)

Rio de Janeiro—Panair do Brasil completed 20 years of operation recently, having carried 1,242,573 passengers.

Beginning overseas operations in 1946, its planes have made 1624 trans-Atlantic flights. Regular services now cover 50,334 route miles, and are served by 16 DC-3s, five Constellations, three C-47s and four Catalina flying boats.

Mid-year traffic reports showed that 1950 will be Panair's biggest year.

IATA Schedules First U.S. Meeting

The annual general meeting of the International Air Transport Assn., the first ever to be held in the U.S., is scheduled to convene today in San Francisco at the Fairmont Hotel. Sessions will continue for four days.

Warren Lee Pierson, chairman of the board of TWA, will take office as president for the ensuing year and preside over the general meeting. He will succeed Dr. Albert Plesman, president of KLM.

The ten U.S. airlines which are members of IATA will act as hosts to the executives of more than 50 airlines from about 45 countries.

WHAT'S NEW

New Books

Air Transportation—Traffic and Management, Thomas Wolfe, formerly vice president of Pan American World Airways clearly shows the apparently indefatigable labors that make it a reference of the highest caliber.

Wolfe seems to have left no stone unturned in seeking out what makes the airlines function. The 711 pages contain information on every important facet of today's problems and practices in management and traffic.

Economics, revenue and sales are covered in description of merchandising problems practices and procedures. Spotlighted are the production of saleable space and utilization of aircraft. Given is the method by which an airline organization is set up and operated, as well as efficient administration of the traffic department. Selling, publicity, advertising are also analyzed. Standard data, such as U. S. airlines and the airway system, and regulations, round out the picture. The book is profusely illustrated.

Published by McGraw-Hill Book Co., 330 W. 42 St., New York 18, price $8.00.

New Addresses

C. E. Mathews, Inc. & Charles E. Mathews and Co., Inc., have transferred the general offices of their aviation division and the aviation shipping and receiving department to Building 802, South Field, Miami International Airport. Mailing address is P. O. Box 822, Miami International Airport, Miami, Fla.

Tinnerman Products, Inc., have moved Speed Nut plant. Shipping address is 8700 Brookpark Road, Cleveland. Mailing address is Box 6688, Cleveland 1.

George H. Scragg has moved his sales promotion offices to 743 East 82 St., Cleveland.

Pierce Governor Co., Anderson, Ind., has opened an East Coast aviation branch office at 250 Fulton Ave., Hempstead, N. Y. Robert C. Sellers has been appointed the company's liaison service engineer at the new office.

New Literature

A Study of the Fairchild Engine & Airplane Corp., is a financial and operational history of the company with comments on its future prospects, prepared for Fairchild by Selig Altschul Aviation Advisory Service, 25 Broad St., New York 4.

ADVERTISERS IN THIS ISSUE

AVIATION WEEK—OCTOBER 16, 1950

PROFESSIONAL SERVICES—
First issue of each month

SEARCHLIGHT SECTION
(Classified Advertising)

EDITORIAL

CAB's Reply to the Generals?

A Civil Aeronautics Board examiner has recommended against awarding a certificate of convenience and necessity to two pioneer irregular international air freight carriers. The companies are Seaboard & Western, and Transocean.

As we pointed out on this page last week, the examiner virtually ignored the vitally important fact that both carriers have contributed to national defense at times when the Air Force needed cargo planes and needed them pronto. One of the Civil Aeronautics Act's three major purposes was to set up services to aid national defense.

The Department of Defense seeks as large an operating fleet of cargo aircraft as the economy can justify. Neither Seaboard & Western nor Transocean seeks a nickel of government mail subsidy. Both are in black ink operations. They seek and deserve a permanent right to the services they have already proven can be made to pay off commercially, between emergency periods when their Air Force needs them.

We suggest that the Civil Aeronautics Board read the following, it is obvious the examiner didn't:

August, 1950

Mr. Raymond A. Norden, President
Seaboard and Western Airlines, Inc.
80 Broad Street
New York, N. Y.

Dear Mr. Norden:

Operational reports of the Military Air Transport Service reveal that a Seaboard and Western Airlines DC-4, which departed Fairfield-Suisun Air Force Base on 3 July 1950, was the first commercial airplane to take off in the contract airlift across the Pacific to Japan. We note that history has repeated itself, since another Seaboard DC-4 made the first commercial flight from Westover Field to Frankfurt, Germany, in support of "Operation Vittles" on 30 June 1948.

We in MATS appreciate the support of all of the airlines involved in the Pacific Airlift. Please accept the congratulations of the Military Air Transport Service for the prompt manner in which your company initiated operations in support of this emergency.

Sincerely,
Carlton J. Martin, Colonel, USAF
Chief, Civil Air Division
Military Air Transport Service
Andrews A. F. Base
Washington 25, D. C.

September 22, 1948

Dear Mr. Norden:

I should like to take this opportunity to convey the gratitude of the Air Force for the cooperative attitude of your organization in connection with the MATS auxiliary program which has been instrumental in furnishing much needed air support from the U. S. to Germany in order that Operation Vittles might continue.

When this requirement for additional support first developed in late June of this year, your ability to offer service in meeting the emergency movement of C-54 engines to Europe was most gratifying. Since that time your organization has met scheduled commitments very efficiently and has maintained excellent relationships at Westover Air Force Base and Frankfurt Air Base in Germany. In performing approximately 56 flights in support of this exceedingly important operation, your airline has been of genuine service to the military establishment.

Please be again assured of our gratitude for your alertness, availability, and spirit of cooperation, as well as our continued desire to avail ourselves of your service at such time as conditions may warrant the purchase of additional commercial lift in the Atlantic area.

Sincerely yours,
W. E. Farthing, Brig. Gen., USAF
Chief, Transportation Division
Office, Deputy Chief of Staff, Materiel

A statement by Maj. Gen. L. S. Kuter, MATS Commanding General, on June 1, 1949:

Since the fleet and facilities of MATS could meet but a fraction of the essential airlift requirements which would exist almost immediately with the outbreak of a major war, continued effort should be made by all responsible agencies to create an adequate reserve national fleet of large transport aircraft.

Because the very nature of MATS is by design that of a small nucleus capable of rapid and extensive expansion in time of national emergency, a critical requirement in the entire air transport picture is the organization, training and maintenance of an adequate air transport reserve force.

Our problem—and that of national defense is therefore not one of organization or lack of experience. It is one of airplanes—that great pool of large transports which would be needed critically and almost immediately in any serious national emergency.

It is obvious that the USAF cannot finance or maintain such an enormous fleet of transports. Yet an answer . . . must be found.

You are all thinking, naturally, of the commercial airlines, whose planes and people did such a yeoman job during the war. Unfortunately, the total number of transport planes in commercial service today falls far short of even modest emergency requirements. This is particularly true of large 4-engine transports in international, over water service.

General Hoyt S. Vandenberg, Chief of Staff, USAF, on April 16, 1949, said:

In an emergency . . . speed is essential. The airlift capacity which the Air Force should provide for the Army as well as for its own needs can never be adequate until we greatly expand our civil air transport. Not even the wealthiest nation on earth can afford to maintain a sufficient war-emergency air transport capacity in unproductive reserve during peace. . . .

The quality of our transport planes, our crews, and our business enterprise will contribute to this goal. The air transport industry must be backed up by alert, forward-looking aircraft manufacturers.

Famous clipper ships of a century ago gave America its first and only leadership in international transport. This is the kind of leadership I hope we can recapture today by increasing our air transport overseas as well as at home. International air transport is an indispensable ingredient of our air strength, for our overseas air route mileage exceeds that of our domestic routes.

To such expert testimony, the examiner in the Seaboard and Transocean case replies as follows:

"An enlarged reserve pool of equipment and flight personnel can be obtained along with lower rates for shippers equally well by the presently certificated carriers as by the applicants."

—Robert H. Wood

Rescue! from the skies

Adrift in life rofts an a chappy sea—but rescue is at hand by the Piasecki Helicapter. Develaped far the Navy, the all-metal HR2-P makes possible rapid rescue fram the sea, fram Arctic wastes, fram uninhabited areas that defy ordinory rescue aperatian. The Piasecki HR2-P is anather step in the Navy's lang-ronge helicapter development pragram.

The wide, unobstructed cabin, which can carry up ta 12 litters, or, in an emergency, as many as 27 men, is made passible by the tandem ratar design which characterizes oll Piosecki Helicapters. In the HR2-P, os in earlier madels, the main Ratar Drives ore monufactured by Faate Bros.

These drives include Faate Bras. "A-Q" Geors of such extreme precisian that, despite their light weight and thin sectians, they permit high laading. "A-Q" Gears bring new standards af speed, campactness, low naise level, and olso assure efficiency that marks a new advance in gear design.

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